Three essays on empirical financial accounting

by

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To my family, who offered me unconditional love, support, and have always been there for me.

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Abstract

As Barth (2015) states, financial accounting is essential to financial accountability, which is essential to a prosperous society. Financial accounting research plays a significant role in providing evidence to support or refute what is believed to be true and in providing new insights into the potential shortcomings of current accounting as well as offering insights into potential improvements. In particular, in this thesis, I focus on empirical financial accounting of financial and non-financial firms using archival methods. The emphasis of this work is twofold. Firstly, I focus on the financial reporting quality of banks and the effect of regulation and monitoring agents in bank managers' incentives. Secondly, I focus on the role of common ownership in the financial reporting quality of non-financial firms.

This thesis contains three chapters. In Chapter 1, we analyze the role of regulation in shaping bank managers' incentives relative to regulatory capital management. In Chapter 2, we study the role of the auditor in securing banks' financial reporting quality. Finally, in Chapter 3, we study whether common ownership is related to firms' financial reporting quality.

Banks are critical to nationwide economic growth, and particularly to local economic development, where small and medium enterprises rely on bank financing to run their businesses, and ultimately, create employment and wealth. Because of their importance, bank supervision is intended to protect the safety and soundness of the financial system on behalf of depositors and shareholders. Hence, understanding banks' financial reporting choices and incentives is essential.

In Chapter 1, *"Regulatory capital management to exceed thresholds"* (co-authored with Silvina Rubio), we document a discontinuity around the 10% regulatory capital ratio of public and private US commercial banks. This threshold separates well-capitalized from adequately capitalized banks, granting benefits to banks that fall into the former category. We find that the strength of the discontinuity varies with changes in regulations affecting banks' incentives and ability to meet the threshold. Importantly, we show that this behavior is also prevalent among non-listed banks, which reduces concerns about other confounding factors, such as capital market pressures, driving our results. We find that the significance and magnitude of the discontinuity varies predictably with banks' incentives to exceed the threshold: lower deposit insurance fees, access to brokered deposits, and access to financial activities.

Banks use accounting and non-accounting tools to exceed the threshold. We find that banks exercise accounting discretion over abnormal loan loss provisions and realized gains and losses on available-for-sale securities to reach the well capitalized categorization. Banks also rely on non-accounting discretion: they raise equity either directly or through transfers from the parent holding company, and tilt risk weighted assets towards safer asset classes to fall above the discontinuity. Lastly, we exploit this discontinuity to show that regulatory capital management has detrimental effects on bank stability when banks use accounting management but not when they raise the level of equity.

We contribute to the literature on benchmark-beating behavior by showing that non-earnings goals are also important drivers of accounting choices. We also provide new evidence that when regulation sets explicit targets, it creates agents' incentives to actually meet these targets with unintended consequences. Besides, we contribute to the literature on regulatory arbitrage by providing evidence that banks use real and accrual management to increase regulatory capital at a specific threshold in contrast to previous literature that assumes that reporting higher figures is better.

In a related project, we study the role of the auditor in securing banks' financial reporting quality. In Chapter 2 *"The unintended consequences of external auditing in small private banks"* (co-authored with Beatriz García Osma), we examine the interaction between auditor and supervisor monitoring over the financial reports of private banks. Despite coinciding objectives, their joint effects are far from obvious. In particular, we analyze whether a voluntary audit impacts on bank managers' choices between accrual-based and real management to increase regulatory capital and whether these choices differ according to supervisory scrutiny. We find that audited banks are more likely to engage in real regulatory capital management. This suggests private banks may choose to audit their accounting as a signaling tool for the supervisor. In the presence of a strict supervisor and an auditor, there is a trade-off in banks' choices between real and accrual-based management. In the latter case, banks engage in accrual regulatory capital management rather than real management. Taken together, the evidence suggests that auditors' insurance on the quality of financial reports negatively affects banks' behavior.

Finally, in Chapter 3, *"Common ownership and financial reporting quality"* (co-authored with Facundo Mercado and Silvina Rubio) we hypothesize that when institutional investors have concentrated ownership within an industry, they are more likely to understand the dynamics of firms' operations, increasing their monitoring ability, what ultimately reduces agency cost and managerial incentives to misreport. In preliminary results, we find that there is a positive association between common ownership and several measures of financial reporting quality, such as comparability, discretionary accruals, and real earnings management. This association is not captured by institutional ownership, product market competition or other known determinants of financial reporting quality.

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Chapter 1

Regulatory capital management to exceed thresholds

Co-authored with Silvina Rubio.

1.1 Introduction

Thresholds on regulatory capital are often used by regulators to restrict certain bank activities and to determine whether to initiate supervisory intervention in problem banks (Peek and Rosengren, 1996; Benston and Kaufman, 1997; Van den Heuvel, 2002). As a result, banks may try to manage their accounts to accommodate their results to these thresholds. In this paper, we ask four questions: (i) Do banks react to the regulatory thresholds? (ii) What are the incentives to do so? (iii) (How) do banks use accounting and non-accounting discretion to meet or exceed the thresholds? and (iv) What are the consequences of this behavior? First, we document a discontinuity around the 10% threshold of regulatory capital, the figure that separates *adequately capitalized* from *well capitalized* banks and that grants the latter access to some activities restricted to the former. Second, we show that the discontinuity is driven by incentives to meet the threshold: a lower assessment rate on insured deposits, access to brokered deposits, and (since 1999) access to non-financial activities. Third, we find that banks exercise accounting discretion over abnormal loan loss provisions (ALLP) and realized gains and losses (RGL) on available-for-sale (AFS) securities to reach the well capitalized categorization. Banks also rely on non-accounting discretion: they raise equity either directly or through transfers from the parent holding company (EqTS), and tilt risk weighted assets (ARWA)[1] towards safer asset classes to fall above the discontinuity. Finally, using a regression discontinuity design, we show that while regulatory capital management with ALLP and RGL (and to some extent ARWA) has a detrimental effect on bank stability, raising equity to exceed the threshold has no impact on banks. These results are consistent with thresholds inducing regulatory capital management when supervisors use these reference points to assess banks (Degeorge et al., 1999).

It is not clear ex ante whether there should be a discontinuity around regulatory capital thresholds. In a Modigliani and Miller (1958) world, banks' capital structure is irrelevant, and there is no reason to observe such patterns. However, in the presence of frictions, such as moral hazard due to deposit insurance, capital structure matters. The standard view is that banks maximize their value by maximizing the fraction of insured deposits, which should lead to all banks holding the minimum regulatory capital (Marcus, 1984; Mishkin, 2007). However, a stream of literature suggests that in the presence of market or depositor discipline, regulatory capital is not binding (e.g., Martinez Peria and Schmukler, 2001; Allen et al., 2011). Gropp and Heider (2010), analyzing U.S. and European banks in the Basel I period, conclude that "capital regulation and buffers may only be of second-order importance in determining the capital structure of most banks" (pp. 590). Therefore, whether banks react to these thresholds is ultimately an empirical question.

We use the Federal Deposit Insurance Corporation Improvement Act (FDICIA) as our main setting to explore this question. The act was passed in 1991 by the U.S.

[1] To construct the *abnormal* portion of risk weighted assets (ARWA) we use the previous quarter (or year) as a benchmark for the normal distribution of asset classes to compare what the regulatory capital would have been had the bank maintain that same distribution in a given quarter.

Congress in response to the savings and loans crisis of the late 1980s and early 1990s. The FDICIA requires banking agencies to implement prompt corrective actions (PCA), placing banks in one of five capital categories, as determined by capital measures: well capitalized, adequately capitalized, undercapitalized, significantly undercapitalized, or critically undercapitalized.[2] The use of thresholds to classify banks was intended to make intervention by bank supervisors both more timely and less discretionary (Peek and Rosengren, 1996). Banks that violate capital requirements (undercapitalized or worse) incur significant costs, including the cost of being liquidated (Van den Heuvel, 2008; Amel-Zadeh et al., 2017). However, for banks that are above the minimum requirement, having capital above 10% creates a competitive advantage (Dechow and Schrand, 2004). We explore whether, why and how banks react to this threshold and the consequences for financial stability.

We base our inference on the universe of FDIC-insured commercial banks in the U.S. (listed and non-listed) from 1996 to 2009 (main sample) and from 2010 to 2014 (post-crisis period). We first analyze the distributional properties of reported regulatory capital ratios and document a sharp discontinuity around the 10% threshold of reported regulatory capital between 1996 and 2009. We find that the discontinuity is statistically significant using different bandwidths, nonparametric tests, and alternative polynomial orders (Calonico et al., 2014, 2017). This result suggests that banks avoid being below the threshold and are willing to inflate regulatory capital to avoid falling below 10%. Hence, we examine banks' incentives to meet the threshold.

Since the enactment of the FDICIA, well capitalized banks have had a competitive advantage relative to their adequately capitalized counterparts, and we find that, in general, the significance and magnitude of the discontinuity varies predictably with the incentives provided by this act to exceed the 10% level. First, well capitalized banks pay lower FDIC premiums (Dechow and Schrand, 2004).[3] To analyze whether deposit

[2]https://www.federalreservehistory.org/essays/fdicia

[3]Between 1996 and 2006, the assessment rate is 3 bps for adequately capitalized banks and 0 bps for well capitalized institutions. The rates changed after 2007, but the spread between well and adequately capitalized banks remains at approximately 3 bps.

insurance matters or whether the discontinuity is driven by other incentives, we exploit an amendment in the regulation that changes the reporting date used by the FDIC to determine the regulatory capital to estimate the rates applied to invoices, payable semi-annually. Until 1999, for the assessment period beginning the following July 1 (January 1), institutions were assigned a capital group based as of December 31 (June 30) of the previous year. We find that the discontinuity is insignificant in the odd quarters of each year until 1999 and strongly significant in the even quarters, consistent with banks managing regulatory capital to avoid paying assessment fees. In 1999, the FDIC amended this regulation to use more up-to-date information in determining banks' risk classification, and effective April 2000, they used the March 31 and September 30 call reports data for deposit insurance calculation. We observe that the discontinuity becomes highly significant in the odd quarters once the FDIC starts using them for the assessment fees.

Second, the FDICIA grants well capitalized banks unrestricted access to brokered deposits, while adequately capitalized banks have to submit a waiver to the FDIC office to accept, renew and roll over this type of deposit, imposing differential costs on banks that fall into this category (Barth and Sun, 2018). We find that the significance and magnitude of the discontinuity is statistically and economically larger for banks that, at some point during our sample period, have brokered deposits relative to banks that never have them. Our findings suggest that the application process is too costly for adequately capitalized banks; therefore, banks will refrain from requesting the waiver to inflate their regulatory capital.

Third, being well capitalized might reduce supervisory scrutiny. It is reasonable to believe that bank managers focus on thresholds because the parties concerned with the bank's performance do (Degeorge et al., 1999). More precisely, small institutions can extend their full-scope, on-site examination from 12 to 18 months if they are well capitalized.[4] We compare the distribution of regulatory capital for small and large banks

[4]During most of our sample period, *small institutions* are banks with assets below 250 million dollars. The banks should also have outstanding or good CAMELS ratings and must not have undergone changes

and find that while the discontinuity is stronger in the former (consistent with small banks having higher incentives to meet the threshold), the difference between both distributions is statistically insignificant, providing little support for the effect of the supervision channel on managing regulatory capital.

Later, the Gramm-Leach-Bliley Act of 1999 allowed well capitalized banks to control or hold an interest in financial subsidiaries to engage in expanded financial activities that are not directly permissible for banks, further enhancing the incentives to fall above the 10% threshold. Exploiting time series variation due to the passage of this act, we find that the discontinuity is statistically and economically stronger after 1999, consistent with banks managing to engage in financial activities.

The changes in regulation and supervision announced as part of the new Basel III Accord, with new and more stringent capital requirements and larger and systemically important banks facing higher capital requirements (Barth and Miller, 2018), made the 10% threshold irrelevant for many depository institutions. We document that the discontinuity vanishes in the post-crisis period. The economic magnitude of the discontinuity is negligible, and the statistical significant drop substantially. We explore how more stringent capital requirements might have induced banks to anticipate Basel III and increase their regulatory capital before the effective date. Following Hendricks et al. (2019), we use the fact that one of the provisions proposed in December 2009 was that mortgage services rights (MSR) would be partially deducted from Tier 1 capital, and the weight of these assets on the denominator would increase. We find that while banks with positive MSR on their balance sheets were engaging in benchmark-beating behavior before the crisis, they cease to manage around the threshold in the post crisis period. Likewise, under Basel III, systemically important financial institutions would be subject to higher capital requirements, meaning that for these banks, the 10% threshold is no longer relevant. We explore the distribution of regulatory capital for banks that belong to systemically important financial institutions and find that while they were bunching

in control in the previous year to qualify for extended examination cycles.

to the right of the 10% threshold during the main sample period, none of these banks fall near the 10% threshold after the crisis. Together, these results indicate that BASEL III new and more stringent and bank specific capital requirements reduce the relevance of the 10% threshold.

Next, we explore how banks manage regulatory capital: accounting discretion (ALLP and RGL) (Ahmed et al., 1999; Beatty and Liao, 2014; Ng and Roychowdhury, 2014; Barth et al., 2017) and non-accounting tools (EqTS and ARWA) (Ashcraft, 2008; Duchin and Sosyura, 2014; Gropp et al., 2018). Loan loss provisions reduce Tier 1 capital (because they reduce shareholders' equity). However, part of the provision can be added back to capital as Tier 2. The net effect of the provision on regulatory capital depends on whether the bank has reached the 1.25% limit that regulators allow banks to add back. We find that the probability of having accretive ALLP to increase Tier 1 capital (provisioning less than expected) discontinuously increases for banks that would have missed the 10% ratio of regulatory capital before ALLP. Likewise, we find evidence of banks overprovisioning to increase regulatory capital through an increase in Tier 2. Alternatively, banks can increase regulatory capital by selectively selling securities to realize gains. We find evidence consistent with banks being more likely to exhibit accretive RGL when they are close to, but to the left of, the threshold before accounting for RGL. Finally, we also find evidence consistent with banks using non-accounting tools to boost their regulatory capital above 10%. We document that banks are more likely to issue stock or receiving capital transfers from parent institutions, or to switch the distribution of asset classes away of assets with high capital consumption when they were about to miss the threshold before these adjustments. The economic magnitude in all cases is large: the probability of having accretive ALLP, RGL or EqTS or ARWA increases by more than 75% in the $\pm 0.25\%$ interval around the 10% threshold. These results are robust to alternative bandwidths around the cutoff and polynomial orders. We find that the distribution of regulatory capital before those adjustments is smoother, suggesting that banks use these tools to artificially keep regulatory capital above the threshold.

Finally, we investigate the consequences of regulatory capital management. We exploit the discontinuity in the likelihood of regulatory capital management due to incentives provided by regulation in a fuzzy regression discontinuity design (Almeida et al., 2016). We find that accretive ALLP and RGL made by banks that would have fallen below the 10% threshold is associated with lower bank stability as proxied by the Z-score.[5] We also find some evidence of ARWA increasing bank fragility, but results are less robust in this case. Although titling the portfolio towards low weight assets might reduce banks' risk, banks might be increasing risk within the same asset class, as documented previously by Duchin and Sosyura (2014). Overall, these results are consistent with banks pursuing excessive risk taking, with adverse effects not only for shareholders but also for the banking system as a whole. The results provide evidence of the unintended consequences of regulatory capital thresholds. We find that the probability of default remains unchanged when banks boost their regulatory capital using equity sales and transfers.

In additional tests, we explore alternative explanations for the discontinuity. Our results might be driven by public banks that are exposed to market pressures and career concerns to meet certain thresholds (Stein, 1989; Graham et al., 2005a; Asker et al., 2014). To explore this possibility, we analyze the distribution of regulatory capital for public and private banks separately. The results show that the discontinuity is highly significant in both subsamples, which is inconsistent with short-term pressures inducing public bank managers to engage in myopic benchmark-beating behavior. Alternatively, the discontinuity could be driven by rounding around integers rather than by PCA classifications (Carslaw, 1988; Thomas, 1989). We explore the discontinuity around other natural numbers and do not find statistically significant discontinuities, supporting our argument of a regulation-driven discontinuity. Notably, the discontinuity is

[5]This proxy has been widely used in the literature, particularly when analyzing private banks for which data on stock volatility are not available (e.g., Laeven and Levine, 2009; Houston et al., 2010; Kanagaretnam et al., 2014; Keppo and Korte, 2016).

insignificant for the 8% ratio, which is the minimum required by the Basel Committee on Bank Supervision in our main sample period. Because violating the minimum regulatory capital is a serious matter for banks, most of them maintain a buffer above 8% (Van den Heuvel, 2008; Amel-Zadeh et al., 2017). The latter provides a rationale for why few banks fall around the 8% figure, and therefore, the discontinuity is not significant, unlike in the 10% case.

Our study contributes to the literature on benchmark-beating behavior (Degeorge et al., 1999). Most studies focus on listed firms and show that firm managers engage in accruals and real management to meet or beat analysts' forecasts (e.g., Hribar et al., 2006; Burnett et al., 2012; Almeida et al., 2016) or to avoid reporting losses or decreases in earnings (Hayn, 1995; Burgstahler and Dichev, 1997). Our results indicate that non-earnings goals are also important drivers of accounting choices (e.g., Dichev and Skinner, 2002; Gaver and Paterson, 2004; Dyreng et al., 2017). We show that the distribution of reported regulatory capital ratios exhibits a statistically significant discontinuity around the 10% threshold. Importantly, we show that this behavior is also prevalent among nonlisted banks, which reduces concerns about other confounding factors, such as capital market pressures, driving our results.

In addition, we contribute to the literature on regulatory arbitrage by providing evidence that banks use both accounting and non-accounting tools to increase regulatory capital. An extensive body of research shows that bank managers use discretion over accounting rules to increase or smooth earnings and to increase regulatory capital (e.g., Moyer, 1990; Kim and Kross, 1998; Ahmed et al., 1999; Beatty et al., 2002; Karaoglu, 2005; Beatty and Liao, 2014; Ng and Roychowdhury, 2014; Barth et al., 2017). Alternatively, banks can manage, risk weighted assets (Duchin and Sosyura, 2014; Gropp et al., 2018), equity sales and transfers (Ashcraft, 2008), or other non-accounting tools (e.g., loan sales and securitizations (Karaoglu, 2005), or asset-backed commercial paper conduits (Kisin and Manela, 2016)). Different from previous literature, in this paper, we do not assume that reporting higher regulatory capital figures is always better; rather, we explore accounting management around thresholds created by regulatory rules. We further provide evidence of the negative consequences of regulatory capital management for bank stability. Importantly, banks might succeed in managing regulatory capital, which might diminish the effectiveness of banking supervision and, ultimately, the safety and soundness of the financial system (Delis et al., 2016; Lambert, 2018). Because banks are important to economic growth nationwide (Jayaratne and Strahan, 1996; Rajan and Zingales, 1998), and particularly to local economic development (Guiso et al., 2004; Rice and Strahan, 2010), understanding their incentives to manage regulatory capital is critical to assess the true financial health of the banking system and identify troubled banks in a timely manner.

Finally, our paper sheds light on the ongoing debate about the regulation of brokered deposits (Barth and Sun, 2018). The FDIC is currently undertaking a comprehensive review of the rules around brokered deposits and the limits on interest rates applicable to banks that are adequately capitalized (or undercapitalized).[6] We show that regulation creating a wedge in the cost of brokered deposits for adequately and well capitalized banks might induce the former to manage accruals or to engage in suboptimal real decisions, which might ultimately affect banks' stability.

1.2 Institutional framework

1.2.1 Incentives to exceed thresholds

The savings and loans crisis of the late 1980s and early 1990s was the most severe banking crisis since the Great Depression (Benston and Kaufman, 1997). The average number of bank failures rose from 15 in the 1934-1981 period to 200 per year in the late 1980s and cost taxpayers more than $100 billion dollars (Mishkin, 1997). This crisis ultimately resulted in the passage of the FDICIA, enacted by the US Congress in 1991, which intended to make supervisory intervention more timely and less discretionary, reducing

[6] See, for instance, https://www.fdic.gov/news/board/2018/2018-12-18-notice-sum-i-fr.pdf.

the cost of bank failure by accelerating the closure of failing institutions and initiating early supervisory intervention in troubled banks (Peek and Rosengren, 1996; Mishkin, 1997).[7] In this paper, we limit our attention to the PCA legislation, a cornerstone of the FDICIA, which introduced capital ratios as triggers that initiate mandatory actions by regulators (Jones and King, 1995; Peek and Rosengren, 1996).[8]

Under the PCA, each insured depository institution is placed in one of five possible categories based on its regulatory capital position: well capitalized, adequately capitalized, undercapitalized, significantly undercapitalized or critically capitalized.[9] Banks below 8% of regulatory capital are considered undercapitalized, incurring both out-of-pocket and opportunity costs (Dechow and Schrand, 2004). For instance, undercapitalized banks have to suspend dividends, have restrictions on asset growth and must prepare a capital restoration plan (Peek and Rosengren, 1996). Because the majority of banks hold an equity buffer above the regulatory capital minimum to cover the possibility of an adverse shock that could lead to capital inadequacy (Van den Heuvel, 2008; Amel-Zadeh et al., 2017), we do not analyze the discontinuity around the 8% threshold.[10]

Banks with regulatory capital above 8% do not have major restrictions on their operations. However, the 10% threshold has been used since the introduction of the PCA to impose differential costs and grant access to certain activities to banks on either side of the discontinuity, creating a competitive advantage for well capitalized banks (Dechow and Schrand, 2004). Degeorge et al. (1999) show that if stakeholders evaluate managers following a "threshold mentality," the latter will have incentives to manage reported

[7]See Mishkin (1997) and Benston and Kaufman (1997) for a more comprehensive review of the act.

[8]The PCA also considers other capital ratios, such as the Tier 1 and leverage ratios. However, in our sample, we find that when the total risk-based capital ratio (regulatory capital, for short) is above 10%, in general, the other two ratios exceed their thresholds. We have only 0.02% of cases (99 bank-quarter observations) in which this is not the case. We focus only on regulatory capital since it is unlikely that these cases will affect our results.

[9]Regulators might also downgrade a bank based on their own examination. However, anecdotal evidence suggests that this is not a widespread practice. For instance, Benston and Kaufman (1997) state that between the end of 1992 and mid-1996, regulators downgraded only two banks.

[10]We have only 659 bank-quarter observations (348 banks) in our sample below the 8% threshold, and we do not observe a significant discontinuity around it. We further discuss this possibility in Section 1.6.1.

numbers to meet stakeholders' expectations, generating distortions and discontinuities in the distribution of reported earnings. When banks respond to these thresholds, the distributions of reported regulatory capital are expected to be distorted: far too few fall just below a threshold, while too many fall just above it (Degeorge et al., 1999).

It is important to note that although bank holding companies (BHCs) are also subject to regulatory capital minimums, the PCA requirements apply only to banks, which motivates the analysis at the bank level. There are no explicit benefits to being above the 10% threshold for BHCs.

In the spirit of Goncharov et al. (2018), we predict that the significance and magnitude of the discontinuity will vary according to banks' *incentives* and *ability* to control their reported regulatory capital ratio, as described below.

Assessment rates

Insurance deposit fees are directly related to the PCA classification. The FDIC uses a risk-based premium system that assesses higher rates on those banks that pose more significant risks to the Deposit Insurance Fund (Dechow and Schrand, 2004). These risk premiums discontinuously increase around the 10% threshold. For instance, during most of the sample period considered in this paper (1997 to 2006), the premium for well capitalized banks was equal to zero and that for adequately capitalized banks was 3 bps. In 2007, the premiums changed to a range of 5 to 7 bps for the former and 10 bps for the latter.[11] In other words, banks that fall below the 10% regulatory capital effectively have a higher cost of doing business due to the higher fees charged by the Deposit Insurance Fund.

[11]These are the rates that apply to institutions in Supervisory Group A, i.e., with CAMEL ratings of 1 or 2. Approximately 95% of all institutions were both well capitalized and had a CAMEL rating of 1 or 2 during this time period according to the FDIC. Similar differential assessment rates apply to institutions in Supervisory Groups B or C based on their regulatory capital.

Brokered deposits

The regulation grants well capitalized banks unrestricted access to brokered deposits, while banks that are adequately capitalized need a waiver from the FDIC to accept, roll over and renew these deposits, and when granted, they have restrictions on interest rates (Benston and Kaufman, 1997; Mishkin, 1997; Van den Heuvel, 2002). A brokered deposit is a deposit made to a bank by a deposit broker (an agent engaged in placing deposits from other people with insured institutions). Like equity, core deposits or other liabilities, brokered deposits are used to finance bank operations. However, regulators have typically imposed restrictions on brokered deposits that are perceived to be too risky (Barth and Sun, 2018). According to FDIC (2011), these deposits are typically more expensive and volatile than core deposits due to their high sensitivity to interest rates and are associated with unsound practices aiming to accelerate growth in loans and investment portfolios. They are also associated with higher chances of bank failure and higher losses for the FDIC (Schaeck, 2008). By requiring adequately capitalized banks to submit a waiver to operate with these deposits, the FDICIA creates a wedge in the cost of brokered deposits for adequately capitalized banks compared to their well capitalized counterparts, not only because of the direct and indirect costs of the waiver but also because it might be denied. Thus, banks have incentives to exceed the threshold to avoid those costs.

Supervision

The PCA legislation introduced capital ratios as triggers that initiate mandatory actions by regulators (Peek and Rosengren, 1996). Given that supervisors use regulatory filings to track banks' financial condition (Agarwal et al., 2014), it is possible that banks want to exceed the threshold to reduce the likelihood of supervisory visitations or administrative actions. The 10% threshold is also relevant in defining the periodicity of examinations for some institutions. The FDICIA generally requires annual full-scope, on-site examinations of insured depository institutions at least once during each 12-

month period and allows for 18-month intervals for certain *small institutions*[12] if specified conditions are satisfied. One condition for applying extended examination to these small institutions is that the institution should be well capitalized. Then, relative to large financial institutions, the smaller counterparts have additional benefits to exceed the 10% threshold and reduce supervisory scrutiny.[13]

Financial activities

The Financial Services Modernization Act (or Gramm-Leach-Bliley Act) passed in 1999 and allowed banks to control or hold an interest in financial subsidiaries to engage in expanded financial activities that were not directly permissible for banks.[14] The act requires the bank and each affiliated depository institution to be well capitalized and well managed to be authorized to conduct activities that are financial in nature. Likewise, a BHC must certify that *all* of its depository institution subsidiaries are well managed and well capitalized to become a financial holding company.

Changes after the financial crisis

The most recent financial crisis proved that banking supervision and regulation had flaws, and regulators promptly responded to the crisis with the announcement of Basel III, which was intended to strengthen microprudential regulation and supervision and added a macroprudential overlay. Under the new supervisory framework, there are new and more stringent capital requirements, and larger and systemically important banks face higher capital requirements (see Barth and Miller, 2018, for a comprehensive

[12] The asset eligibility threshold for extended examination cycles was 250 million starting in February 1997 and was later raised to 500 million (2007). The threshold was further changed in 2015 and again in 2018.

[13] This is a noisy classification because there are some other criteria that small institutions have to meet to become eligible, some of which are not observable to us. Beginning in February 12, 1997, the rest of the requirements include: (i) At the most recent examination, the institution was found well-managed and the composite condition was 'outstanding' or 'good' (CAMELS 1 or 2), (ii) no person acquired control of the institution during the 12-month period in which a full-scope examination would be required, and (iii) the institution currently is not subject to a formal enforcement action.

[14] The act authorizes activities such as (i) security underwriting and dealing, (ii) insurance agency and underwriting, and (iii) merchant banking activities and any other activity that the Federal Reserve Board determines as financial in nature.

review). While the 10% threshold was still in place and well capitalized banks would still benefit from lower assessment rates, access to brokered deposits, lower supervision and access to financial activities, for many banks, this ratio was no longer binding after Basel III. For instance, for systemically important financial institutions, the minimum regulatory capital would reach as high as 17.5% when adding up the minimum total capital, the capital conservation buffer, the countercyclical capital buffer, and the global systemically important banks surcharge (Barth and Miller, 2018).

In addition, a large fraction of banks received government support to improve their capitalization (Duchin and Sosyura, 2014), which might have pushed the distribution of regulatory capital to the right. Moreover, the use of multiple thresholds (supplementary leverage ratio, stronger core capital requirements), together with the implementation of stress testing programs, might hinder banks' ability to meet all requirements simultaneously to comply with the regulation (Bennett et al., 2017). In addition, there was an increase in the number of supervisors in all supervisory agencies, relaxing human capital constraints,[15] which might have deviated the focus from rules or thresholds to thorough examinations of individual banks.

The Basel III consultative document was released in December 2009, and although the new regulation followed phase-in adoption (mostly) between 2013 and 2015, banks made strategic financial reporting and operational changes even before the regulation was enacted (Hendricks et al., 2019). This suggests that if the changes announced after the last financial crisis made the 10% threshold irrelevant for many banks, the effects would be evident before the effective date.

1.2.2 Regulatory capital management

The total risk-based capital ratio or regulatory capital ratio is used broadly by supervisors to evaluate banks' financial health. It is composed of the sum of the risk-based

[15] For instance, Eisenbach et al. (2016) documents that the FRB has increased the number of employees conducting supervisory duties by approximately 50% since the last financial crisis. The FDIC, in its 2010 and 2008 annual reports, also highlighted the recent incorporation to the payroll to meet the need for additional human resources.

Tier 1 and Tier 2 ratios. After the Basel Capital Accord (Basel), Tier 1 was defined as core capital including common equity, perpetual preferred stock and minority interest and excluding intangibles, unrealized gains and losses on AFS securities, and loan loss reserves. Tier 2 is secondary capital and includes loan loss reserves (up to 1.25% of risk-weighted assets), undisclosed reserves, and subordinated debt. Bank managers have some discretion when applying accounting rules, and they can use it to increase the reported regulatory capital. Accounting discretion may facilitate opportunistic or misguided behavior by managers that can reduce bank transparency and lead to other negative consequences (Bushman and Williams, 2012).

We explore both accrual and the real discretionary choices made by managers to increase the capital ratio. While accrual-based capital management activities have no effect on cash flows, real management activities deviate from normal business practices and have direct consequences for cash flows (Roychowdhury, 2006a; Cohen and Zarowin, 2010). Moreover, accrual-based activities can be performed at the end of or after the reporting period, while real management activities must be adjusted during the reporting period. However, the former are more likely to drive auditor and supervisory attention than real management activities (Cohen and Zarowin, 2010; Burnett et al., 2012; Barth et al., 2017).[16]

Not only can banks rely on accounting discretion to increase the numerator of reported regulatory capital, but they can also directly issue equity or receive transfers from the parent institution (Ashcraft, 2008), which would arguably have different consequences for bank stability (Ng and Roychowdhury, 2014). Finally, we explore whether banks manage the denominator, risk-weighted assets, to tilt the portfolio toward assets with less capital consumption.

[16]Other ways of managing the regulatory capital ratio include, for instance, a reduction in risk-weighted assets (Duchin and Sosyura, 2014; Gropp et al., 2018) or loan sales, securitizations (Karaoglu, 2005), and the use of asset-backed commercial paper conduits (Kisin and Manela, 2016), but they are outside the scope of this paper.

Accrual management

Loan loss provisions are a large accrual for commercial banks, and they are fundamental to banks' performance and health (Beatty and Liao, 2014).[17] However, given that they are based on estimated loan losses, they are subject to considerable discretion, and their estimation might be very volatile.

Changes in loan loss reserves affect regulatory capital ratios in two opposite ways. An increase in loan loss provisions decreases Tier 1 capital because it reduces shareholders' equity. Loan loss reserves are excluded from Tier 1 because they have been created against identified losses and therefore are not freely available to meet unidentified losses that may subsequently arise, which is the essence of having regulatory capital (Beatty and Liao, 2014). Therefore, for each dollar that the bank is not provisioning (even though it should), Tier 1 capital increases by one unit minus the marginal tax rate (see Table 2).[18] We use the abnormal component of loan loss provision to observe whether bank provision is less than normal to manage regulatory capital, where the normal provision is estimated using the preferred Beatty and Liao (2014) model.

Another way to manage regulatory capital is through Tier 2. Although loan loss reserves cannot be considered to belong to Tier 1, regulatory capital guidelines allow banks to add a proportion of these reserves back as Tier 2 capital. Loan loss reserves can be added back as capital up to a limit of 1.25% of the risk-weighted assets. If loan loss reserves exceed the limit, there is no effect on Tier 2 capital (only the aforementioned effect on Tier 1 capital). If loan loss reserves do not exceed the 1.25% limit and loan loss provisions are positive, there are two possible scenarios: (i) banks can add back the risk-weighted loan loss provision if it does not exceed the difference between 1.25% and the

[17] Although this provision can be very small compared to net interest income, net non-interest income, and securities gains, banks' net income has the highest correlation with loan loss provision compared to these other components of the income statement (Beatty and Liao, 2014).

[18] Note that if loan loss reserves are below 1.25% of risk-weighted assets, underprovisioning will lead to an overall decrease in regulatory capital because the effect on Tier 2 capital will be larger than the effect on Tier 1 capital; therefore, we do not consider underprovisioning to be a form of regulatory capital management. In other words, underprovisioning makes sense only when the bank has reached the 1.25% limit.

risk-weighted loan loss reserves, or (ii) banks can add the difference between 1.25% and the risk-weighted loan loss reserves if the loan loss provision exceeds this difference. Then, the overall effect of loan loss provisions (taking into account the decrease in Tier 1 capital and the increase in Tier 2 capital through add-backs) on regulatory capital can be positive (see Table 2) (Ng and Roychowdhury, 2014).

Real management

In our paper, real management involves managing regulatory capital by entering into transactions (selling securities) that are reflected in financial reporting. Real earnings (or capital) management is not subject to ex post scrutiny from auditors, and firms engage in this kind of management when their ability to exercise discretion over accruals is constrained (Cohen and Zarowin, 2010; Burnett et al., 2012). However, this type of strategic selling behavior might be costly (Barth et al., 2017).

FASB Accounting Standards Codification Topic 320 (ASC 320) created a new accounting treatment for AFS securities.[19] ASC 320 requires AFS securities to be measured at fair value and changes in fair value to be recognized in other comprehensive income.[20] Therefore, unrealized gains and losses are not included in Tier 1 capital. AFS securities are recognized as earnings only when realized (sold).[21] Consequently, banks can selectively sell their AFS securities to realize gains and increase Tier 1 capital. An extra dollar in RGL on AFS securities increases Tier 1 capital by one unit minus the tax

[19]Prior to ASC 320, banks treated these securities either as investments or as trading securities. For our sample period, this treatment was unchanged, except that starting in 1998, banks were allowed to include 45% of their unrealized gains and losses on AFS *equity securities* as Tier 2. Barth et al. (2017) find that the percentage of AFS equity securities in bank portfolios is small.

[20]ASC 320 defines two other investment categories that, because of their accounting rules, do not create the opportunity to opportunistically use discretionary accounting to manage regulatory capital. The second category is equity, and debt securities classified as *held for trading* are measured at fair value, with changes in fair value (unrealized gains or losses) recognized in income. The third category of investment is *held to maturity*, which is measured at amortized cost, and changes in value are not recognized. Transfers between investment categories in most circumstances are not allowed. For more detail, see Bushman and Landsman (2010), Beatty and Liao (2014) and Barth et al. (2017).

[21]Security sales affect both the numerator and the denominator of the capital ratio. With the sale, there is a change in the composition of the risk-weighted portfolio, that is, the denominator. Unfortunately, we cannot trace the change in the portfolio's composition, and we therefore focus on the effect on the numerator.

rate (see Table 2) (see Barth et al. (2017) for further detail). Notice that with the implementation of Basel III, this regulatory capital management mechanism does not longer hold for several banks since unrealized gains and losses on available for sale securities have to be part of Tier 1 (Beatty and Liao, 2014). U.S. final rule allows non-advanced approaches banks to make a one-time choice to continue the treatment under previous capital rule (opt-out). For those that do not opt-out and advanced approaches banks, unrealized gains and losses on available for sales securities will flow through Common Equity, and therefore thorough Tier 1.

Non-accounting-based capital management

Banks that find it beneficial to have regulatory capital above the 10% threshold can also boost the ratio by increasing the equity portion. This can be done directly by issuing new shares or, for banks that belong to a BHC, through capital injections (Ashcraft, 2008). Recapitalization by equity transfers and sales increases Tier 1 capital on a one-to-one basis.

Regarding equity transfers, BHCs have incentives to keep all their banking subsidiaries well capitalized. Reporting low regulatory capital at the subsidiary level might draw regulatory scrutiny even if the BHC has sufficient capital as a group. The Federal Reserve Board (the agency that supervises BHC) uses not only FR Y-9C but also call reports as inputs in its supervisory process.[22] Moreover, the FDICIA gives the Federal Reserves authority “to force a parent to sell a non-banking subsidiary if the parent refused to use non-banking assets to support a troubled affiliate” (Ashcraft, 2008, pp.289). Additionally, BHC subsidiaries can benefit from having regulatory capital above 10%, which ultimately benefits the whole group.

Finally, we examine whether banks manage the risk weighted assets to meet the well capitalized status. Banks can change the composition of the balance sheet towards assets with smaller weights to shrink the denominator. For instance, they might reduce

[22]Board of Governors of the Federal Reserve System (US). Division of Banking Supervision and Regulation, (2019).

their exposure to mortgages on residential property risk weighted at 50% to invest more on claims guaranteed by the U.S. Government assigned to the 20% category. Gropp et al. (2018) show that banks react to higher capital requirements by reducing the risk weighted assets, particularly their credit exposures to corporate and retail clients. Note that while changing the balance sheet composition might be effective in increasing reported regulatory capital, it does not necessarily mean that the bank portfolio will be safer. For instance, Duchin and Sosyura (2014) document that after receiving governmental aid, banks initiate riskier loans mostly within the same asset class (same risk weights), which remained undetected by regulatory capital ratios.

1.3 Sample and variable definitions

1.3.1 Sample

Our main dataset includes the universe of listed and non-listed insured commercial banks from 1996 to 2009 (main sample) and from 2010 to 2014 (post-crisis period).[23] Our main sample begins in 1996 because data on total risk-based capital are available only from 1996, and it ends in 2009 because after the announcement of Basel III, incentives to exceed the threshold vanish, and the discontinuity is no longer relevant (we show this in Section 1.4.1). For that reason, we use the transition years, since the announcement of Basel III to the implementation, as a kind of *placebo* period.

We collect quarterly accounting information from call reports. We drop banks with negative values for total assets and loans. We winsorize all continuous variables, except for regulatory capital, at the 1% and 99% levels to reduce the influence of outliers. In the case of regulatory capital, in our main analysis, the variable is trimmed at the 8% and 12% levels, i.e., in the $\pm 2\%$ interval around the threshold that separates adequately from

[23] We do not continue the analysis after 2014 because, starting from 2015, Basel III is mandatory and affect the spirit of our analysis. For instance, with the enforcement of Basel III, unrealized gains and losses on available for sale securities can be part of Tier 1 capital (Beatty and Liao, 2014), and this eliminates an accounting option to manage regulatory capital. Additionally, our purpose is to take advantage of the transition period to show how banks adjust their accounts in order to comply with the upcoming regulation.

well capitalized banks.[24] The main sample contains 99,960 bank-quarter observations from 6,161 unique banks.

1.3.2 Variable definitions

The main variable of interest used in the paper is the reported regulatory capital, $RegCap$, measured as the sum of Tier 1 and Tier 2 capital normalized by risk-weighted assets. This variable is used to classify banks as well or adequately capitalized (or below).[25] In addition, we create a dummy variable, Low_RegCap, that is equal to one if $RegCap$ is below 10%, and zero otherwise.

We explore several accounting tools that banks can use to manage their regulatory capital. $ALLP$ is estimated using the preferred Beatty and Liao (2014) model as a benchmark normalized by risk-weighted assets.[26] RGL is calculated as realized gains and losses on available-for-sale securities normalized by risk-weighted assets. We also consider non-accounting tools to manage regulatory capital. $EqTS$ is the sum of treasury stock transfers and sales of stocks normalized by risk-weighted assets. Finally, we estimate the regulatory capital that the bank would have had if they had maintained the distribution of assets classes that the bank had in the previous quarter.[27] $ARWA$ is the increase in regulatory capital (relative to risk weighted assets) due to the alternative distribution of asset classes, holding total assets constant.

In the spirit of Hribar et al. (2006) and Almeida et al. (2016), we identify ALLP and

[24]The purpose of trimming at the 8% and 12% levels is to analyze regulatory capital distribution in the vicinity of the 10% threshold. Banks that have regulatory capital ratios well in excess of 12% might have different business models, characteristics, and incentives. Including this information in the analysis introduces more variation, but at the cost of more noise in the results (Roberts and Whited, 2013).

[25]A bank is considered "well capitalized" if $RegCap$ is higher than or equal to 10%, the Tier 1 ratio is higher than or equal to 6%, and the Tier 1 leverage ratio is higher than or equal to 5%. In our sample, we find that in more than 99% of the cases, when $RegCap$ is above 10%, the other two ratios exceed their thresholds. For this reason, in our study, we examine only the regulatory capital ratio.

[26]Loan loss provisions are estimated as a function of the change in past, current and future nonperforming assets, bank characteristics, and macroeconomic variables (see Beatty and Liao, 2014, Model (c), pp.366): $LLP_{i,t} = \alpha_0 + \alpha_1 \Delta NPA_{i,t+1} + \alpha_2 \Delta NPA_{i,t} + \alpha_2 \Delta NPA_{i,t-1} + \alpha_3 \Delta NPA_{i,t-2} + \alpha_4 Size_{i,t-1} + \alpha_5 \Delta Loan_{i,t} + \alpha_6 \Delta Unemployment_t + \alpha_7 \Delta GDP_t + \alpha_8 RealEstateIndex_t + \epsilon_{it}$. See the Appendix A.7 for more details.

[27]Alternatively, we consider the distribution of asset classes in the same quarter of the previous year as a benchmark. Results are qualitatively similar in this case.

RGL, which would allow banks to increase their regulatory capital by at least 0.05%, according to the following equations:

$$Accretive\_ALLP\_T1 = 1 \quad \text{if} \quad (1-\tau)ALLP \leq -0.05\% \tag{1.1}$$

$$Accretive\_ALLP\_T2 = 1 \quad \text{if} \quad \tau ALLP \geq 0.05\% \tag{1.2}$$

$$Accretive\_RGL = 1 \quad \text{if} \quad (1-\tau)RGL \geq 0.05\% \tag{1.3}$$

Likewise, we identify equity sales and transfers, EqTS, which would allow banks to increase regulatory capital by at least 0.05%, as:

$$Accretive\_EqTS = 1 \quad \text{if} \quad EqTS \geq 0.05\% \tag{1.4}$$

$$Accretive\_ARWA = 1 \quad \text{if} \quad ARWA \geq 0.05\% \tag{1.5}$$

where $Accretive\_X$ is an indicator for executing accretive $ALLP$, RGL, $EqTS$, or $ARWA$ to increase regulatory capital by at least 0.05%.[28] τ is the bank's marginal tax rate. We estimate the bank's marginal tax rate following Graham and Mills (2008)'s specification except for S-corporations, for which we use the reported income taxes over income before taxes (see Appendix A.2 for further detail).

We then estimate a set of "unmanaged" regulatory capital, absent accruals, real management, and recapitalization. In particular, we re-estimate the regulatory capital before ALLP ($RegCap\_ALLP$), RGL ($RegCap\_RGL$), EqTS ($RegCap\_EqTS$), and ARWA

[28]There is a trade-off regarding the size of the cutoff. On the one hand, a smaller cutoff is more likely to capture noise than an actual manipulation aiming to change the regulatory capital. However, because banks that are very close to the threshold are more likely to engage in regulatory capital management, using a cutoff that is *too* large might imply not correctly identifying some activities that are, in fact, accretive. To address this potential concern, we run a set of robustness tests using different cutoffs, and the results remain unchanged.

($RegCap\_ARWA$) as follows:

$$\begin{aligned} RegCap\_ALLP &= RegCap + (1-\tau)ALLP \quad if ALLP < 0 \,\&\, LLR > 1.25\% \\ RegCap\_ALLP &= RegCap - \tau ALLP \qquad\qquad if ALLP > 0 \,\&\, LLR < 1.25\% \end{aligned} \tag{1.6}$$

$$RegCap\_RGL = RegCap - (1-\tau)RGL \tag{1.7}$$

$$RegCap\_EqTS = RegCap - EqTS \tag{1.8}$$

$$RegCap\_ARWA = RegCap - ARWA \tag{1.9}$$

Following the prior literature, we include a set of control variables, $Controls_{i,t-1}$ (Beatty and Liao, 2014; Ng and Roychowdhury, 2014; Duchin and Sosyura, 2014; Lim et al., 2016; Barth et al., 2017; Berger et al., 2018; Gropp et al., 2018; Kandrac and Schlusche, 2018). $Size$ is the natural logarithm of total assets. $Loan$ is total loans normalized by total assets at the beginning of the quarter. $Public$ is a dummy variable that takes the value of 1 if the bank is publicly traded. Following Duchin and Sosyura (2014) and Berger et al. (2018), we include proxies of the CAMELS examination ratings.[29] $Asset\_Quality$ is loan loss allowance, $Management\_Quality$ is non-interest expenses, $Earnings$ is the net income, $Liquidity$ is the ratio of cash, and $Sensitivity\_Mkt\_Risk$ is non-interest income; all variables are normalized by total assets at the beginning of the quarter. All control variables are lagged (see Appendix 2.3.1 for further details).

[29] The CAMELS rating is a weighted average of six components: capital adequacy, asset quality, management quality, earnings, liquidity, and sensitivity to market risk. The rating has a scale of 1 to 5, in which 1 is considered a satisfactory condition and 5 represents an extreme level of regulatory concern. These ratings are strictly confidential, and the weights are set according to the personal judgment of the examiner. We do not include in our regressions $Capital\_Adequacy$ (measured as equity or Tier 1 capital) because it is highly correlated with $RegCap$ (the pairwise correlation is approximately 0.7).

Finally, we measure bank risk-taking using the Z-score, defined as the ratio of return on assets plus the capital asset ratio divided by the volatility of return on assets (Ln_ZScore). The Z-score indicates how many standard deviations of the return on assets the bank has to lose to become insolvent. Following the previous literature, we use the natural logarithm of the Z-score, as this proxy is highly skewed (Laeven and Levine, 2009; Houston et al., 2010; Kanagaretnam et al., 2014). A higher Z-score indicates that the bank is more stable, i.e., has a lower probability of insolvency. This measure has some limitations, such as the use of accounting data to estimate it. However, other proxies for bank solvency rely on market data, which are not available for the majority of our sample of commercial banks.

1.3.3 Summary statistics

Table 1.2 provides descriptive statistics for the variables included in the main tests.[30] The sample is restricted to banks that have reported regulatory capital between 8 and 12%. The mean $RegCap$ is 10.93%, which suggests that most banks report regulatory capital above 10%.[31] The table also shows that $Accretive\_ALLP\_T1$ is the accounting tool most widely used to boost regulatory capital, consistent with Beatty and Liao (2014). We find that 9.23% of bank quarters in the $\pm 2\%$ interval are suspect of having underprovisioning to increase regulatory capital, while we find that only 1.90% are suspect of overprovisioning ($Accretive\_ALLP\_T2$). Almost 3% of banks have $Accretive\_RGL$. Regarding non-accounting capital management, we find that 37.06% of bank quarters in the $\pm 2\%$ interval have $Accretive\_RWA$[32] and that 11.16% have $Accretive\_EqTS$.[33] Ln_ZScore mean is 4.61, indicating that, on average, profits have to fall by 100 times

[30] We present correlation matrix in Appendix, Section A.3.

[31] In untabulated results, we find that the mean $RegCap$ in the unrestricted sample is 17.49%, well above the 8% required by the Basel Committee, which is consistent with previous literature (see, for instance, Ng and Roychowdhury (2014) and Barth et al. (2017)).

[32] Note that there are only 65,078 bank-quarter observation because data on weighted assets are available only from 2001.

[33] From the 6,161 banks in our sample, 80% belong to a BHC. The later explains why $EqTS$, which has an untabulated mean of 0.08%, is composed mostly by equity transfers, 76%. To increase regulatory capital, banks belonging to a BHC mostly use equity transfers while stand-alone banks use sales of capital stock.

their standard deviation to deplete bank equity.

The mean of total deposits is 1.6 billion dollars and represent 86.57% of total assets. Considering that in most of our sample period, the assessment rate was 3 bps higher for adequately capitalized banks than for well capitalized banks, this difference represents 0.48 million dollars. The latter figure is an extra cost that banks might be willing to avoid. Beside, brokered deposits represent 3.93% of total deposits for banks. There is huge variation at the bank level in terms of the fraction of brokered deposits that they hold. In untabulated results, we find that the median bank does not have this type of deposit, while for banks in the 99th percentile, they represent 36.59% of total deposits. These figures are consistent with Barth and Sun (2018). In our sample, while the average size is 12.2, 57.9% are small institutions that potentially can benefit from a lower frequency of on-site examinations. The rest of the table presents summary statistics for other control variables. The figures are consistent with those in previous papers.

1.4 Results

1.4.1 Do banks react to regulatory capital thresholds?

In this section, we document the existence of a discontinuity around the 10% threshold of regulatory capital. We further show that this discontinuity is likely to be driven by regulations relying on this threshold to separate adequately capitalized from well capitalized banks, with certain privileges being granted to banks that belong to the latter group, creating incentives for banks to be above the threshold, as discussed in Section 1.2.1.

Panel A of Figure 1.1 provides a graphical representation of the distribution of regulatory capital ratios for our main sample period, 1996 to 2009, the period in which we can identify that banks' incentives to manage regulatory capital lie to the right of the threshold. A graphical inspection reveals a strong jump in the density function of reported regulatory capital ratios at the 10% threshold. In Panel B, we restrict the analysis to the ± 2 interval around the 10% threshold and formally evaluate the statistical significance of the discontinuity based on nonparametric tests (Calonico et al., 2014, 2017). Using local polynomial density estimation with robust standard errors, we find that the discontinuity is statistically significant (t-statistic=16.91) and robust to alternative bandwidths and polynomial orders.

In Table 1.3, we present a year-by-year estimation of the discontinuity. The table shows that the number of observations in the 8% to 10% interval is significantly lower than the number in the 10% to 12% interval in every year. Moreover, the number of observations in the 10% to 12% interval grows until 2008, when they represent 28% of the sample, and then subsequently drop, accounting for 8.8% of the sample in 2017. We further discuss this point below and provide suggestive evidence that there is a shift in the distribution that is likely driven by changes introduced in the post-crisis period. Column (5) reports the t-statistics (based on nonparametric tests using a local polynomial density estimation with robust standard errors (Calonico et al., 2014, 2017)) and shows that the discontinuity is statistically significant in almost every year until the last financial crisis.

We have discussed above that the 10% threshold is relevant for depository institutions but not necessarily at the BHC level. Section A.4 of the Appendix presents the results consistent with this argument. In particular, the discontinuity in the reported regulatory capital ratio for BHCs is economically smaller, and the statistical significance drops substantially. Using the same nonparametric tests used above, we find a t-statistic equal to 2.61 for the main sample period, 1996-2010, and 0.28 after the crisis.[34] In regard to the holding institution, the regulatory capital will depend on the assets and equity of each banking subsidiary and the non-banking affiliates. We conduct a subsample analysis for BHCs with one subsidiary and BHCs with more than one and find that the discontinuity is driven by the former. This is consistent with the idea that when each individual subsidiary is trying to maintain at least 10% of regulatory capital, the con-

[34]The t-statistic is 1.22 before 1999 and 2.19 between 1999 and 2010.

solidation of the individual banks is less likely to fall just to the right of the threshold.

So far, we have discussed the discontinuity for the regulatory capital ratio. However, to be considered well capitalized banks should keep at least 6% of Tier 1 ratio (Tier 1 capital normalized by risk weighted assets), and 5% Leverage ratio (Tier 1 capital normalized by total assets). In Figure A.2, in Section A.5 of the Appendix, we present the distribution of these ratios for the main sample period and show that there is no economically significant kink around those minimum requirements. We interpret these results as evidence that the binding ratio for commercial banks is the risk-based capital ratio.

1.4.2 Banks incentives and ability to be well capitalized

We next explore whether the significance and magnitude of the discontinuity vary according to banks' *incentives* and *ability* to control their reported regulatory capital ratio. By doing so, we also test whether the discontinuity is driven by incentives created by regulation.[35] Following Goncharov et al. (2018), we provide both a graphical representation of the discontinuity and test its relative magnitude in different subsamples using χ^2 tests. We further provide t-statistics using nonparametric tests for each subsample (Calonico et al., 2014, 2017).

We first explore whether banks want to avoid regulatory capital shortfalls to reduce the cost of deposit insurance. During most of our sample period, the *assessment rate* was 3 bps higher for adequately capitalized banks than for well capitalized banks. Based on deposits held by banks in our main sample, a 3 bps rate represents a mean (median) 2.3% (2.4%) of banks' annual net income, which seems to be a cost banks might be willing to avoid.

To better disentangle whether assessment rates explain (part of) the discontinuity, we exploit a change in the reporting date used to determine the capital component of the assessment risk classification for the estimation of deposit insurance. Until 1999, the

[35] In Section 1.6.1, we further discuss alternative explanations for the discontinuity.

FDIC risk-based assessment regulation specified that the capital component assigned to a bank for the semiannual assessment period would be determined based on data reported by the bank in its call report for the quarter ended six months earlier. That is, the assessment for the first (second) semiannual period was June (December) of the previous year. Rule 12 C.F.R. Part 327 (published by the FDIC on December 16, 1999, effective April 1, 2000) was intended to permit the use of more current capital information in determining institutions' risks and proposed moving the capital reporting date forward by 90 days. Effective April 2000, March 31 became the new date for the assessment period beginning the following July, and September 30 became the date for the assessment period beginning the following January 1. This rule implies that if banks wanted to reduce the cost of deposit insurance, they should be more likely to manage regulatory capital in June and September before 2000 and in March and September after that year.

Figure 1.2 presents evidence consistent with insurance fees driving the discontinuity. In particular, Panel (A) shows that the discontinuity was statistically indistinguishable from zero in quarters 1 and 3 for the period 1996-1999, but it was statistically significant in the quarters that were relevant for assessment calculation (t-statistic=7.89), and the difference between them is statistically significant at the 1% level. In addition, when we compare quarters 1 and 3 before and after the change in the reporting date, we also find that the difference is statistically significant. The economic impact is also large: while banks were 1.3 times more likely to report regulatory capital just above 10% than just below before 2000, they became 3.71 times more likely to do so after that year.

Similarly, incentives to exceed the 10% threshold may be higher when banks rely on *brokered deposits* to finance their activities. As explained above, the FDICIA imposes a differential cost for adequately capitalized banks by requiring a waiver to accept, renew or rollover brokered deposits. A discontinuity in brokered deposits might arise if the (pecuniary and nonpecuniary) costs of the waiver are sufficiently large or the probability of being granted the waiver falls sharply below the threshold. Nonpecuniary costs include the cost of drawing attention from the FDIC regarding *low* regulatory capital or the cost of disclosing certain information.[36] Based on information provided by the FDIC, the probability of rejection is low: between 1996 and 2009, 369 waivers were submitted, and only 3 were denied. This suggests that, if anything, it might be the cost of the waiver that creates incentives for banks to exceed the threshold.[37]

In Figure 1.3, we sort banks into those that have positive brokered deposits at some point in our sample period (Panel A) and those that never used them (Panel B). We find a larger discontinuity when banks rely on this type of deposit (t-statistic=16.19 for the former and t-statistic=5.88 for the latter). Banks with brokered deposits are 3.38 times more likely to report regulatory capital just above the threshold than just below, while banks that do not use these deposits are 2.23 times more likely. The difference is statistically significant at the 1% level.

Banks might also be willing to hold capital in excess of the 10% threshold to reduce *supervision*. Recall that the aim of the PCA was to identify problem banks in need of intervention on the basis of their reported capital ratio Peek and Rosengren (1996). While legislation requires mandatory actions for banks that are below 8%, it is not clear whether it might also increase scrutiny for adequately capitalized banks. The information on visitations and administrative actions is not publicly available, so we cannot directly test whether this could be the case. However, we make use of other features of regulation to analyze whether banks manage regulatory capital to reduce the burden of supervision by reducing the frequency of on-site examinations from 12 to 18 months. To explore this possibility, we sort banks into those below and those above the eligibility threshold and compare the distribution of regulatory capital of these groups. Because

[36]For instance, the application should include information on the volume, rates, and maturities of the brokered deposits currently held or anticipated during the waiver period or an explanation of how brokered deposits are costed and compared to other funding alternatives and how they are used in the institution's lending and investment activities (FDIC Rules and Regulations §303.243).

[37]Figure A.4 (Panel B), in the Appendix, Section A.6, shows that the 10% threshold actually limits banks' access to brokered deposits in the following year. Because brokered deposits and equity are alternative sources of financing for banks (Barth and Sun, 2018), keeping core deposits constant, there should be a negative relationship between regulatory capital and (changes in) brokered deposits. Banks just to the left still have positive changes in brokered deposits (which is consistent with the FDIC granting the waiver), but the changes are lower as bank capitalization falls.

only small institutions are eligible for the extended cycle, they have more incentives to manage regulatory capital. Large institutions will have 12-month examinations regardless of whether they are adequately or well capitalized.

Figure 1.4 presents the results. Panel A presents the discontinuity for small banks (eligible for expanded examinations) and large banks (non-eligible). We restrict the sample of banks to those that are relatively close to the eligibility threshold to avoid other confounding factors that might create incentives to exceed the threshold and are unrelated to supervision. Panel A includes banks with assets in the interval of \$200-\$250 million between 1997 and 2006. Panel B includes banks with assets ranging from \$250 to \$300 million between 1997 and 2006. We do not consider observations before 1997 because two applicable thresholds were in place depending on whether banks were qualifying 1- or 2-rated institutions. As the qualification is not publicly available, we cannot disentangle which threshold was applicable for each observation.We also do not consider observations after 2007 because the \$500 million threshold imposes additional costs for large banks that are unrelated to supervision.[38] We present the results in Table 1.4. While the t-statistic is higher for small banks, the χ^2 test indicates that we cannot reject the hypothesis that the ratio of banks just above/below the 10% threshold is the same for small and large institutions.

The passage of the Gramm-Leach-Bliley Act in 1999 might have further increased banks' incentives to meet the 10% threshold, since the act established that all banking subsidiaries should be well capitalized if they were to be allowed to engage in this new set of *financial activities*. To assess the potential contribution of this act to the discontinuity of regulatory capital documented above, we compare the period before and after the act. We consider 1999 as the first year because banks seem to have anticipated the passage of the Act and started managing regulatory capital in 1999, as documented in

[38]For instance, Section 36 of the FDICIA establishes annual independent audit and reporting requirements for insured depository institutions with total assets of \$500 million or more (FDIC Rules and Regulations §363). Having an auditor might hinder banks' ability to manage regulatory capital (Becker et al., 1998).

Table 1.3.[39]

Figure 1.5 presents the distribution of regulatory capital for different subperiods. Panel A shows that for the 1996 to 1998 period, the interval immediately to the left of the 10% threshold has relatively few observations compared to the interval immediately to the right, and the difference is statistically significant (t-statistic=2.58). In Panel B (including observations from 1999 to 2009), the discontinuity becomes even larger (t-statistic=17.77), consistent with the Gramm-Leach-Bliley Act further enhancing the incentives to be regarded as well capitalized. The chi-square test of the difference is significant at the 1% level compared to the earlier period. One potential concern is that the results might be driven by changes in the reporting date used to determine the capital component of the assessment risk discussed above, which was changed in the same year. The results presented in Panel D of Figure 1.2 provide further support for a differential effect of the Gramm-Leach-Bliley Act on banks' incentives to meet the 10% threshold. In particular, we also document an increase in the discontinuity in the second and fourth quarters of each year, which cannot be explained by the assessments.[40]

Panel C plots the frequency of regulatory capital *after the most recent financial crisis* and documents that the discontinuity diminishes drastically and is significantly different from the previous subperiods. Moreover, the distribution shifts to the right, consistent with banks increasing their capitalization after the crisis.[41] As discussed above, under the new supervisory framework, there are new and more stringent capital requirements, which have become higher for some banks (Barth and Miller, 2018).[42] This is also evident from the number of observations in the $\pm 2\%$ interval around the threshold in more recent years (see Table 1.3). The disappearance of the discontinuity in this

[39]The act was signed into Law in November of 1999 (and was passed by a strong majority), but the version submitted to the Senate in April as S. 900 of that year already included the requirement of being well capitalized to engage in financial activities. This implies that banks were able to anticipate it and act accordingly early that year.

[40]If anything, the discontinuity should be lower in these quarters if assessments were the only explanation for it.

[41]The average (reported) regulatory capital for these subperiods is 18.07, 16.86 and 17.51.

[42]In the Appendix, Section A.5, Figure A.3, we also examine whether there is a kink in the new capital ratios in the enforceable phase of Basel III (period 2015-2018). The histograms present no economic significant kink or discontinuity at the thresholds of tier 1, leverage, common equity, and regulatory capital.

period might be explained by banks' anticipation of the Basel III official adoption date.[43]

We first consider the case of more stringent capital requirements. Under Basel III, banks are subject to threshold deductions for some assets, such as mortgage servicing assets, some deferred tax assets, or significant investments in unconsolidated financial institutions' common stock (Barth and Miller, 2018). In addition, Basel III risk-weighting categories increase the risk weight applied to some assets. To further explore this point, following (Hendricks et al., 2019), we look at the case of mortgage services rights. One of the provisions included in Basel III proposed that mortgage services rights (MSR) would be partially deducted from Tier 1 capital, and the weight of these assets in the denominator would be increased. This means that for some banks, Basel III implementation would have heavily reduced their capital if they waited until implementation without either making changes to MSR or increasing other components of Tier 1. We argue that banks with MSR were more likely to anticipate the implementation and increase their regulatory capital after the crisis. In Panel A of Figure 1.6, we present the distribution of regulatory capital for banks that had MSR in December 2009 (in the main sample period), when this provision was first announced (Hendricks et al., 2019). In Panel B, we present the distribution for the same banks after the crisis (2010-2014). The graphical evidence indicates that the discontinuity was significant for these banks during the main sample period. In particular, they were 4.45 times more likely to report regulatory capital just above the 10% threshold than just below it. After the crisis, the ratio is 1.33 and statistically insignificant. However, more importantly, there are few observations around the threshold in the latter period. These results exemplify how some affected banks deviated from the 10% threshold in anticipation of Basel III, consistent with (Hendricks et al., 2019).

We next analyze the case of systemically important banks that are subject to supplementary capital requirements. In Figure 1.7, we plot the distribution of regulatory capital before and after the crisis for banks that belong to BHCs that are considered either

[43] In untabulated results we find that in 2017 (a year in which most Basel III changes where already in place), there were only 58 bank-quarter observation in the 8-10% interval, and 1,671 in the 10-12% interval.

global or domestic systematically important institutions.[44] The figure shows that banks were 14 times more likely to report regulatory capital just above the threshold than just below during the main sample period (1996-2009), while none of these banks have reported regulatory capital ratios below 11% since 2010. The distribution has shifted to the right, which shows that the well capitalized threshold is no binding under the current regulatory framework.

Overall, these results provide evidence that BASEL III new, more stringent, and bank-specific requirements affect the importance of the 10% threshold. Banks that are more likely to be affected by the regulation deviate away from the discontinuity in anticipation of Basel III implementation.

1.4.3 (How) do banks manage regulatory capital?

In this section, we examine the tools that banks use to manage the reported figure. We build on previous literature to identify the accounting and non-accounting tools widely used in the banking industry: $ALLP$ (Beatty and Liao, 2014; Ng and Roychowdhury, 2014), RGL (Barth et al., 2017), $EqTS$ (Ashcraft, 2008), and $ARWA$ (Duchin and Sosyura, 2014; Gropp et al., 2018). In particular, we analyze the relationship between having regulatory capital below 10% before using accounting and non-accounting management and the likelihood of having accretive $ALLP$, RGL, $EqTS$, or $ARWA$ (as defined in Section 2.3.1). Figure 1.8 provides graphical evidence of $Accretive\ ALLP\_T1$ (Panel A), $Accretive\ ALLP\_T2$ (Panel B), $Accretive\ RGL$ (Panel C), $Accretive\ EqTS$ (Panel D), and $Accretive\ ARWA$ (Panel E) in the interval between 8% and 12% of the regulatory capital before those items. The figures reveal a strong and significant jump around the 10% threshold, suggesting that banks are more likely to use these tools when they are close to (but to the left of) the 10% threshold of *unmanaged* regulatory capital.

[44]The Financial Stability Board list of global systemically important institutions is available at https://www.fsb.org/wp-content/uploads/r_111104bb.pdf?page_moved=1. Domestic systemically important institutions are bank holding companies required by the Dodd-Frank Act to have a supervisory stress test ($50 billion or more in total consolidated assets), available at https://www.federalreserve.gov/supervisionreg/dfast-archive.htm.

We find that the corresponding robust t-statistics are -5.66, -3.20, -4.91, -5.51, and -2.18 for Panels (A) to (E), respectively.

To analyze this relationship more formally, we estimate the following specification:

$$Accretive\_X_{i,t} = \beta_1 Low\_RegCap\_X_{i,t} + \sum_{n=1}^{k} \beta_{2k} Def\_RegCap\_X_{i,t}^{k}$$

$$+ \sum_{n=1}^{k} \beta_{3k} Def\_RegCap\_X_{i,t}^{k} \times Low\_RegCap\_X_{i,t} + \gamma Controls_{i,t-1} + \eta_i + \theta_t + \varsigma_j + \epsilon_{it} \quad (1.10)$$

where the dependent variable is $Accretive\_ALLP\_T1$, $Accretive\_ALLP\_T2$, $Accretive\_RGL$, $Accretive\_EqTS$, or $Accretive\_ARWA$. We define the explanatory variable as the deficit (relative to the 10% threshold) of regulatory capital before management $RegCap\_X$. Low_RegCap_X is a dummy variable that takes the value of one if the *unmanaged* regulatory capital is below the 10% level and zero otherwise and represents the discontinuity at the threshold (Roberts and Whited, 2013). $Controls_{i,t-1}$ includes a set of control variables that have been previously used in the literature, such as proxies for CAMELS ratings ($Assets\_Quality$, $Mgmt\_Quality$, $Earnings$, $Liquidity$, $Sensitivity\_Mkt\_Risk$), bank size ($Size$), the fraction of loans to assets ($Loan$), and an indicator variable equal to 1 if the bank is publicly traded ($Public$). All these variables are further explained in Appendix A.1. We also include time fixed effects, θ_t, and supervisor fixed effects, ς_j, in all our specifications. We use three alternative bandwidths around the threshold, $\pm 0.25\%$, $\pm 0.5\%$, and $\pm 2\%$. For the broader interval, we include bank fixed effects, η_i, and second-order polynomials. For the smaller intervals, we estimate a linear specification (Roberts and Whited, 2013). Standard errors are clustered at the bank level.

In Tables 1.4, 1.5, 1.6, 1.7, and 1.8, we explore the relationship between the *unmanaged* regulatory capital and the probability of having accretive $ALLP\_T1$, $ALLP\_T2$, RGL, $EqTS$, or $ARWA$ respectively. Column (1) presents the results for the ±0.25% interval around the 10% threshold (before adjustments) using a polynomial of order 1. In Columns (2) and (3), we use a broader interval, ± 0.5%, with a polynomial order of

1 and 2, respectively. In Columns (4) and (5), we provide the results using the $\pm 2\%$ interval and a polynomial of order 2.

In Table 1.4, we show how having a deficit of regulatory capital affects the probability of underprovisioning to boost the reported figure through an increase in Tier 1 capital.[45] When we look at the $\pm$ 0.25% interval, we find that banks to the left of the threshold are 7.6% more likely to engage in $AccretiveALLP\_T1$, which is economically large (mean of $Accretive\_ALLP\_T1$ is 8.35%). The indicator variable, Low_RegCap_ALLP, remains positive and statistically significant using alternative polynomial orders and bandwidths, which suggests that the discontinuity is not sensitive to those choices. Regarding the economic magnitude, in the interval $\pm 2\%$ (Column (5)), the coefficient indicates a 36.78% increase in the likelihood of having $AccretiveALLP\_T1$ relative to the unconditional mean, which is economically large. The statistically significant coefficient on the interaction term, $Def\_RegCap\_ALLP \times Low\_RegCap\_ALLP$, indicates that the slopes on both sides of the threshold are significantly different. Moreover, the slopes become steeper as the regulatory capital approaches the threshold.

Table 1.5 presents the results using the probability of having $Accretive\_ALLP\_T2$ as the dependent variable. The coefficient Low_RegCap_ALLP measures the differences in the probability of observing $AccretiveALLP\_T2$ for banks on both sides of the discontinuity, and we find that it is positive and statistically significant. This result is consistent with banks exercising discretion by overprovisioning to increase regulatory capital through an increase in Tier 2 capital that pushes them above the 10% threshold. In the interval $\pm$ 0.25%, banks with low regulatory capital before ALLP are 3.1% more likely to report overprovisioning to boost their reported figure. This result is economically large compared to the unconditional mean of 2.67%. The results are robust to the use of an alternative polynomial order and alternative bandwidths.[46]

[45]Recall that we consider only the abnormal portion, where the normal provision is that predicted by the preferred Beatty and Liao (2014) model that takes into account several bank-level variables and state controls that affect loan loss provisions.

[46]Ng and Roychowdhury (2014) argue that regulators will probably also consider the level of Tier 1 capital, and it is therefore necessary to control for it. In untabulated results, we find that our findings hold after the inclusion of that control variable, and they remain highly significant.

Table 1.6 shows that banks below the 10% threshold of regulatory capital before RGL are 5.2% more likely to realize gains on available-for-sale securities compared to banks slightly above that figure. The economic magnitude is huge (approximately 150.51%) compared to the unconditional mean (3.45%). Interestingly, the slope of the curve for banks to the right is statistically indistinguishable from zero, which suggests that the probability of realizing gains is independent of regulatory capital. It seems reasonable that the optimal time for realizing gains will be independent of banks' regulatory capital goals, which explains why there is no relationship between these variables above the 10% threshold. However, this is not the case for banks with regulatory capital below 10%, which might indicate that these banks engage in strategic selling to meet the threshold. The main coefficient of interest, Low_RegCap_RGL, remains statistically and economically significant along all specifications.[47]

In Table 1.7, we show how having a deficit of regulatory capital affects the probability of receiving equity transfers from their BHC or having equity sales to increase regulatory capital. When we look at the $\pm$ 0.25% interval, we find that banks to the left of the threshold are 22% more likely to engage in $Accretive\_EqTS$, which is economically large, 68.17%, given that the mean of $Accretive\_EqTS$ is 32.27% (untabulated). The indicator variable, Low_RegCap_EqTS, remains large, positive, and statistically significant using alternative polynomial orders and bandwidths. The statistically significant coefficient on the interaction term, $Def\_RegCap\_EqTS \times Low\_RegCap\_EqTS$, indicates that the slopes on both sides of the threshold are significantly different, consistent with the graphical evidence presented in Figure 1.8.

Table 1.8 shows the likelihood of titling the asset distribution towards low weight assets as a function of deficit of regulatory capital. When we look at the $\pm$ 0.25% interval, we find that banks to the left of the threshold are 8.1% more likely to en-

[47] For robustness and following Barth et al. (2017), we include unrealized gains and losses (normalized by total assets), which are the accumulated unrealized AFS securities gains and losses at the beginning of the quarter, as an additional control. In untabulated results, we find that the probability of having accretive RGL is increasing in the level of unrealized gains at the beginning of the quarter, as expected. Moreover, the main coefficient of interest, Low_RegCap_RGL, is quantitatively similar and remains statistically significant after the inclusion of that control variable.

gage in $Accretive\_ARWA$, which is economically large, 12.54%, given that the mean of $Accretive\_ARWA$ is 64.60% in this interval (untabulated). The indicator variable, Low_RegCap_ARWA, remains large, positive, and statistically significant using alternative polynomial orders and bandwidths. Consistent with the graphical evidence presented in Panel E of Figure 1.8, the slopes on both sides of the threshold are significantly different, which is evident from the statistically significant coefficient on the interaction term. This analysis considers the distribution of asset classes in the previous quarter as the benchmark for what would have been the normal distribution. Because this is somehow arbitrary, in untabulated results, we also use the distribution of asset classes in the previous year (same quarter) as a benchmark and reach the same conclusion.[48]

We have discussed previously that there is some time variation in banks' incentives to exceed the 10% threshold. In particular, the Gramm-Leach-Bliley Act of 1999 meant a strong increase in the discontinuity from 1999 on, while we document that the discontinuity vanishes after the most recent financial crisis. We explore accounting and non-accounting regulatory capital management in these three time periods: 1996-1998, 1999-2009, and 2010-2014. Table 1.9 presents these results for the interval $\pm 2\%$ around the 10% figure with a polynomial order of 2. Column (1) shows that the main tool used in the main period is $EqTS$, which is economically and statistically significant at the 1% level.[49] The variables that account for managerial discretion are positive, as expected, but statistically insignificant at conventional levels. The results are stronger in the period 1999-2009 (Column (2)), and all the tools explored in this paper become significant and economically larger than in the previous period. After the most recent financial crisis, between 2010 and 2014 (Column (3)), we find that the discontinuity is statistically insignificant for $Low\_RegCap\_ALLP\_T1$, $ALLP\_T2$, RGL, and $ARWA$ consistent with changes in regulation deviating the focus on the 10% figure. With regard to $EqTS$ (Panel

[48]The coefficients (t-stats) for columns (1) to (5) are 0.48 (14.0), 0.41 (13.0), 0.33 (18.4), 0.23 (16.4), and 0.21 (14.5). These higher coefficients suggest that banks might anticipate the drop in regulatory capital and change the asset distribution in advance, therefore, using the previous quarter as a benchmark might underestimate the effect.

[49]Because of data availability, we cannot conduct this analysis for $ARWA$.

D), we find that the probability of $Accretive\_EqTS$ is positive and significant when unmanaged regulatory capital is below the threshold in all subperiods. However, the effect is stronger during the period 1999-2009. While the coefficient of $Accretive\_EqTS$ is higher for the post-crisis period than before 1999, the economic magnitude in the latter is twice that in the former.[50]

So far, we have addressed potential concerns regarding the choice of the polynomial order and bandwidths using variations in both and showing that all the conclusions remain unchanged under alternative specifications (Roberts and Whited, 2013). We still made a choice regarding the magnitude at which the $ALLP\_T1$, $ALLP\_T2$, RGL, $EqTS$, and $ARWA$ are considered accretive, and in particular, in the main tests, we use a cutoff of 0.05% (see Section 2.3.1). To further show that our results are not sensitive to this particular choice, in Table 1.10, we rerun the regressions presented in Tables 1.4, 1.5, 1.6, 1.7, and 1.8 using 0.01% and 0.1% as alternative cut-off points. Overall, we can conclude that bank managers behave opportunistically when banks are close to 10% of the unmanaged regulatory capital.

Finally, in Figure 1.9, we show that the discontinuity is smaller once we take into account regulatory capital management. In Panel A, we plot the discontinuity between 2001-2009 (the period for which we can estimate the five tools discussed above to manage the reported figure). In Panel B, we present the distribution of regulatory capital before accounting management ($ALLP\_T1$, $ALLP\_T2$, and RGL) and find that, compared to the distribution of reported regulatory capital, the discontinuity becomes smaller, and the statistical significance falls drastically from t-statistic = 16.48 to t-statistic = 6.14. In Panel C, we plot the distribution before $EqTS$ and $ARWA$, and find that the discontinuity vanishes in this case (t-statistic=-1.13). Finally, in Panel D, we include both accounting and non accounting tools, and again find that the distribution of *unmanaged* regulatory capital is smooth around the 10% threshold (t-statistic=0.32). These results suggest that some banks with reported regulatory capital above 10% would have been

[50]The unconditional mean in the three subperiods is 0.053, 0.123 and 0.1021 for 1996-1998, 1999-2010, and 2011-2014, respectively.

considered adequately capitalized if they were unable to use their accounting discretion over the reported figure, recapitalized, or tilt risk weighted assets towards assets with lower weights.

1.5 Regulatory capital management and bank risk-taking

There are two opposing views of the consequences of regulatory capital management (Karolyi and Taboada, 2015). On the one hand, banks might improve the allocation of capital if they are constrained from value maximization due to costly regulation. On the other hand, banks engaging in regulatory capital management could pursue excessive risk taking by weakening (or delaying) supervisory intervention. The existing empirical evidence provides mixed results. While Karolyi and Taboada (2015) find evidence consistent with the value-increasing view, Gaver and Paterson (2004), Duchin and Sosyura (2014) and Ng and Roychowdhury (2014) find results consistent with regulatory capital management increasing bank fragility. In addition, the consequences of regulatory capital management for bank stability might vary depending on whether banks use real or accrual accounting management (Cohen and Zarowin, 2010) or non-accounting tools. In this section, we separately analyze each of these tools explored above.

We use a fuzzy regression discontinuity framework, exploiting the discontinuity in the likelihood of accounting- and non-accounting-based management that is caused by regulatory capital considerations around the 10% threshold, as shown in Section 1.4.3. In particular, the first-stage regression is estimated as in Equation 1.10, that is, $Accretive\_X_{i,t}$ is instrumented with $Low\_RegCap\_X_{i,t}$, while controlling for the distance to the threshold. In the second stage, we estimate the following equation:

$$Ln\_ZScore_{i,t+1} = \beta_1 Accret\hat{i}ve\_X_{i,t} + \sum_{n=1}^{k} \beta_{2k} Def\_RegCap\_X_{i,t}^{k}$$

$$+\sum_{n=1}^{k}\beta_{3k}Def\_RegCap\_X_{i,t}^{k}\times Low\_RegCap\_X_{i,t}+\gamma Controls_{i,t-1}+\eta_i+\theta_t+\varsigma_j+\epsilon_{it} \quad (1.11)$$

where the dependent variable is $Ln\_ZScore_{i,t+1}$, the natural logarithm of the Z-score of bank i at time $t+1$. This proxy has been widely used in the literature, particularly when analyzing private banks for which data on stock volatility are not available (e.g., Laeven and Levine, 2009; Houston et al., 2010; Kanagaretnam et al., 2014; Keppo and Korte, 2016). The remaining variables are defined as in Equation 1.10. Similar to the analysis of that equation, we use different polynomial orders and bandwidths for robustness (Roberts and Whited, 2013).

The identifying assumption underlying our research design is that banks close to the 10% threshold (before accounting and non accounting management) are similar, and therefore, we can treat banks that *just beat* that figure as good counterfactuals for banks that *just miss* it, similar to the approach followed by Almeida et al. (2016). We limit the analysis to banks close to the threshold to ensure that we are comparing banks that are as similar as possible and control for other determinants of bank stability, time and supervisor fixed effects (and in the wider bandwidth, bank fixed effects).

The results are reported in Table 1.11. Panels A to E show the results for (instrumented) $Accretive\_ALLP\_T1$, $Accretive\_ALLP\_T2$, $Accretive\_RGL$, $Accretive\_EqTS$, and $Accretive\_ARWA$. The first-stage results are presented in Tables 1.4 to 1.8, but we include the F-test for each specification in Table 1.11 for completeness. In general, we reject the null hypothesis of weak instruments. The second-stage regression results presented in Table 1.11 (Panels A, B, and C) show that regulation-driven regulatory capital management has a detrimental effect on bank stability in $t+1$, consistent with the view that banks engaging in regulatory capital management through accounting discretion pursue excessive risk taking (Gaver and Paterson, 2004; Duchin and Sosyura, 2014; Ng and Roychowdhury, 2014). This finding is robust to alternative bandwidths, polynomial orders, and accounting tools. Moreover, the impact of $Accretive\_ALLP\_T1$, the accounting tool most frequently used by banks, has the smallest consequences for the probability of default, consistent with accruals management being less costly for banks (Cohen and Zarowin, 2010).

When it comes to non-accounting capital management, Panel D shows that when banks use equity transfers or sales to exceed the threshold, there is no significant effect on banks' risk. Contrary to accounting management, this result is consistent with equity (either from parent institutions or raised directly by the bank) overcoming moral hazard problems. Panel E presents the results for banks managing regulatory capital through risk weighted assets. Results are mixed in this case. We find that bank stability decreases in the wider interval, but we do not find a significant result when looking at observations closer to the discontinuity. Recall that, banks with lower RWA (and higher regulatory capital ratios) are not necessarily safer since we do not observe the composition within asset classes (Duchin and Sosyura, 2014). The overall effect on bank stability will depend on whether banks invest in low risk assets as reflected by lower RWA, or whether they simultaneously increase risk taking through within-class risk reallocation.[51]

Finally, we acknowledge that our results might lack external validity because we can only identify a local average treatment effect (as in every instrumental variable approach). However, we believe that this setting is interesting per se, since banking regulation still relies, to a large extent, on thresholds, and banks might be engaging in this type of behavior around other figures (which might be bank specific), since bank managers enjoy considerable discretion when preparing financial statements. Therefore, understanding the consequences of this benchmark-beating behavior is particularly important, since it has consequences for the safety and soundness of the financial system.

[51] In untabulated results we find negative and statistically significant coefficients for all bandwidths (except in the $\pm 0.25\%$ interval) and polynomial orders when using the proportion of asset in each class in the previous year as a benchmark.

1.6 Additional analysis

1.6.1 Alternative explanations for the discontinuity

In this section, we examine several competing explanations for the discontinuity. We will first explore whether public banks, which are arguably more exposed to short-term pressures, are driving our results. There are some concerns as to whether capital markets induce firms to make suboptimal decisions to comply with market expectations, which could be detrimental to long-term value (Stein, 1989; Graham et al., 2005a; Asker et al., 2014). To explore this possibility, in Figure 1.10, we plot the distribution of reported regulatory capital for public and private commercial banks and show that the discontinuity is statistically significant in both subsamples, which suggests that benchmark-beating behavior is pervasive and is not driven by market pressures. Nonetheless, publicly traded banks are 4.12 times more likely to report regulatory capital just above the threshold than just below, while private banks are 2.89 times more likely. The difference is statistically significant at the 1% level.

Alternatively, it could be argued that the discontinuity arises not because of the separation between well capitalized and adequately capitalized banks but rather because of bias around numbers (Kleven, 2016; Allen et al., 2017). The existence of anomalies in earnings numbers is well documented in the literature. Using data from New Zealand listed firms, Carslaw (1988) shows a significant bias toward numbers including a zero, while he finds a consistent lack of nines as the second digit in income numbers. Thomas (1989) finds similar results using US publicly traded firms. These findings might raise some concerns regarding the motivation for managing around the 10% regulatory capital threshold.

To address these concerns, we examine whether there is a discontinuity around other regulatory capital integers: 5% to 13% (see Figure 1.11). The shaded area represents the 95% confidence intervals and is estimated using the $\pm$ 0.5% sample around each natural number. The plots show that there are no statistically significant discontinuities around other integers, which rules out the alternative explanation of bank managers rounding to the next integer. Notably, the discontinuity is marginally significant for the 8% threshold (t-statistic=1.74), that is, the regulatory capital figure that separates adequately capitalized from undercapitalized banks and is the minimum required by the Basel Committee on Bank Supervision. However, the discontinuity is insignificant when considering wider intervals.

Because violating the minimum regulatory capital is a serious matter for banks, imposing large costs on banks falling below that threshold (such as the suspension of dividends and restrictions on asset growth), most banks maintain a buffer above the 8% threshold (Van den Heuvel, 2008; Ng and Roychowdhury, 2014; Amel-Zadeh et al., 2017; Barth et al., 2017). Finally, it could be argued that 10 by itself is a salient number that bank managers try to reach, regardless of FDICIA. However, the disappearance of the discontinuity after Basel III rules out this possibility and supports the argument that discontinuity driven by regulation favors banks just above the threshold.

1.6.2 Spurious correlation

A potential concern with the results presented in Section 1.4.3 is that they might be due to spurious correlation between regulatory capital before the adjustments and $ALLP\_T1$, $ALLP\_T2$, RGL, $EqTS$, and $ARWA$, as the pre-managed regulatory capital is effectively the reported ratio extracting $ALLP$, RGL, $EqTS$, or $ARWA$. In this section, we further discuss this issue. First, our dependent variable is an indicator rather than the subtracted amount itself, which reduces concerns that spurious correlation might be driving the results. Moreover, the placebo tests showing that accrual and real management vanish after 2009 reinforce the idea that the results are driven by the incentives to be above the 10% threshold rather than by spurious correlations related to variable creation.

Alternatively, we check the robustness of the results in several ways. Following Daniel et al. (2008), we construct a variable $Deficit$, which equals $\max\{0, 10-RegCap\_X\}$, rather than the regulatory capital shortfall itself, which weakens the spurious correlation problem. We find similar results under this alternative specification (untabulated).[52] In addition, we test for non-linearities in the relationship between pre-managed regulatory capital and $ALLP$, RGL, $EqTS$, or $ARWA$. If our results are due to spurious correlation between these variables, we should expect to find a linear relationship, whereas if it is indeed due to bank management, we should expect the effect to be stronger for firms close to the 10% threshold of pre-managed regulatory capital (Daniel et al., 2008). We estimate our main equation using intervals of pre-managed regulatory capital,[53] and find that banks that are closer to the threshold have a higher probability of having $Accretive\_X$. In all cases we find stronger effects closer to the threshold. In the particular case of $Accretive\_ALLP\_T1$, $EqTS$ and $ARWA$, we find that the coefficients are significantly different and larger in the smallest interval compared to intervals farther away from the threshold, consistent with the graphical evidence presented in Figure 1.8.

1.6.3 Alternative estimations for the marginal tax rate

The analysis of the accretive ALLP and RGL requires the estimation of the marginal tax rate, which is subject to measurement error. In our main tests, we mainly follow Graham and Mills (2008) (see Appendix A.2 for further details). In this section, we use alternative approaches to estimate the tax rate to show that our results are not driven by our preferred approach to estimating this variable.

We consider three alternative specifications of the marginal tax rate. First, we use Graham and Mills (2008)'s specification (as in our main tests), but we exclude S corporations. S corporations are essentially pass-through entities, and their income is taxed at the shareholder level, meaning that these banks are less likely to experience the tax-effect-driven increase in regulatory capital from ALLP_T2 (Ng and Roychowd-

[52] Available upon request.

[53] In particular, we define four intervals relative to banks that exceed the 10% threshold: between 9.5% and 10% (Deficit_[0,0.5]), 9.5% and 9% (Deficit_[0.5,1]), 9% and 8.5% (Deficit_[1,1.5]) and 8.5% and 8% (Deficit_[1,1.5]).

hury, 2014), while the effect on ALLP_T1 and RGL might be underestimated. The results are presented in Columns (1), (4) and (7) of Table 1.12 (Panel A) and are economically and statistically similar when excluding these banks.

Alternatively, we estimate the tax rate as the income tax expense relative to income before taxes. Even though the marginal tax rate will not necessarily be equal to the mean tax rate, this proxy has the advantage of being a clearer proxy; that is, it is less affected by the assumptions used to estimate the simulated marginal tax rate. The results are presented in Columns (2), (5) and (8) of Table 1.12 (Panel A), and the results are similar to those obtained in the benchmark specification (see Column (5) in Tables 6, 7 and 8). Finally, we use a constant effective tax rate provided by Damodaran,[54] assuming that all banks have the same tax rate over the years (regardless of whether they have gains or losses). Columns (3), (6) and (9) in Table 1.12 (Panel A) present the results and show that the coefficients on Low_RegCap_X are economically larger for Accretive_ALLP_T1 and Accretive_ALLP_T2, while they remain similar for Accretive_RGL.

Overall, we conclude that our results are robust to alternative estimations of the marginal tax rate, and therefore, our results are unlikely to be significantly affected by measurement error in this variable. Using our main and alternative specifications to calculate the marginal tax rate, in Panel B of Table 1.12, we show the number of banks per quarter for the 1996-2009 period that we consider to have accretive tools.

1.7 Conclusion

The FDICIA introduced the PCA legislation that established thresholds on regulatory capital to classify banks. We find that banks react to these thresholds. In particular, we find a statistically significant discontinuity in the distribution of reported regulatory capital ratios around the 10% figure, a threshold that separates well capitalized from adequately capitalized banks. The regulation provides banks incentives to exceed the threshold, such as lower assessment rates on deposits, unrestricted access to brokered

[54] Available at: http://pages.stern.nyu.edu/ adamodar/New_Home_Page/datafile/taxrate.htm

deposits, lower supervision and (since 1999) access to non-financial activities. We find that banks manage regulatory capital to avoid paying assessment fees, to reduce the cost of using brokered deposits and, after the passage of the Gramm-Leach-Bliley Act, to engage in expanded financial activities. The discontinuity vanishes after the financial crisis, which is at least partly explained by more stringent capital requirements and capital buffers, motivating banks to increase capital before Basel III becomes effective.

We explore alternative mechanisms that bank managers use to increase the reported regulatory capital: ALLP, RGL, EqTS, and ARWA. We provide strong evidence that banks use accrual, real management, equity transfers and sales of stock, and shrink risk weighted assets to fall just above the target figure. Our findings reveal benchmark-beating behavior on reported regulatory capital driven by supervisor categorizations of "well capitalized" and "adequately capitalized" banks. Bank managers that opportunistically use the discretion afforded to them by accounting standards and regulatory requirements to distort loan loss provisions and selectively realize securities increase bank fragility, which sheds light on the unintended consequences of regulatory capital thresholds. However, we do not find any effect on bank fragility for banks that boost regulatory capital by issuing stock or receiving capital transfers from parent institutions.

Table 1.1: **Accounting regulatory capital adjustments.** The table presents the accounting regulatory capital adjustments for a unitary increase in ALLP and RGL. It shows the adjustments for Tier 1, Tier 2 and the joint effect on regulatory capital separately.
(*) There is an intermediate case in which the proportion of the abnormal loan loss provision is bigger than the available amount that can be added back to Tier 2 ($[1.25 - \frac{LLR}{RWA}] < \frac{ALLP}{RWA}$). In that case, the total effect on regulatory capital can be positive or negative depending on the magnitude of the coefficients ($-\frac{ALLP}{RWA} \times (1-\tau) + [1.25 - \frac{LLR}{RWA}]$).

Accounting variable	Conditions	Tier 1	Tier 2	RegCap
Loan Loss Provision	If $\frac{LLR}{RWA} \geq 1.25\%$	$-\frac{ALLP_t}{RWA} \times (1-\tau)$	0	$-\frac{ALLP_t}{RWA} \times (1-\tau)$
	If $\frac{LLR}{RWA} < 1.25\%$ *	$-\frac{ALLP}{RWA} \times (1-\tau)$	$\frac{ALLP}{RWA}$	$\frac{ALLP}{RWA} \times \tau$
RGL		$\frac{RGL_t}{RWA} \times (1-\tau)$	0	$\frac{RGL_t}{RWA} \times (1-\tau)$

Table 1.2: **Summary statistics.** Table shows descriptive statistics for the commercial banks used in this paper. Sample period is 1996:Q1–2009:Q4 for the subsample, restricting the interval to ±2% around the 10% threshold of regulatory capital. All variables except for $Size$ and Ln_ZScore are multiplied by 100 for expositional convenience. Because of data availability, the analysis for $ARWA$ starts in 2001:Q1. All variables are defined in Appendix A.1.

	Obs (1)	Mean (2)	SD (3)	Q1 (4)	Median (5)	Q3 (6)
RegCap	99960	10.93	0.01	10.47	10.99	11.49
Accretive_ALLP_T1	99960	9.23	28.94	0.00	0.00	0.00
Accretive_ALLP_T2	99960	1.90	13.65	0.00	0.00	0.00
Accretive_RGL	99960	2.93	16.87	0.00	0.00	0.00
Accretive_EqTS	99960	11.16	31.48	0.00	0.00	0.00
Accretive_ARWA	65078	37.06	48.30	0.00	0.00	100.00
Ln_ZScore	98949	4.61	0.70	4.15	4.67	5.12
Total_Deposits	99960	86.57	9.14	81.59	87.42	92.26
Brokered_Deposits	99960	3.93	7.80	0.00	0.00	4.20
Capital_Adequacy	99960	8.55	2.08	7.46	8.19	9.09
Asset_Quality	99960	0.96	0.38	0.74	0.91	1.10
Management_Quality	99960	0.84	0.32	0.66	0.79	0.95
Earnings	99960	0.43	0.24	0.31	0.43	0.56
Liquidity	99960	4.49	3.17	2.61	3.68	5.33
Sensitivity_Mkt_Risk	99960	0.24	0.22	0.12	0.19	0.29
Public	99960	21.41	41.02	0.00	0.00	0.00
Size	99960	12.20	1.36	11.28	12.02	12.90
Loan	99960	75.53	10.85	68.91	75.83	82.78

Table 1.3: **Tests of discontinuity in annual distributions of regulatory capital at the 10% threshold.** This table presents the total number of observations in the full sample (Column 2) and the number of observations just to the left (Column 3) and just to the right (Column 4) of the 10% threshold. T-statistics (Column 5) are calculated using local polynomial density estimation (polynomial of order 2) for the trimmed sample (Calonico et al., 2014, 2017).

Year (1)	Total Obs (2)	Obs (8%,10%) (3)	Obs (10%,12%) (4)	T-Stat (5)
1996	35,823	467	4,980	1.73
1997	34,194	601	5,433	1.11
1998	32,777	623	5,706	2.35
1999	31,775	705	6,383	5.93
2000	31,015	750	7,240	4.34
2001	30,514	663	7,415	4.73
2002	30,105	551	7,100	5.52
2003	29,528	364	6,865	5.68
2004	28,890	300	6,981	5.22
2005	28,283	241	7,188	5.13
2006	27,639	186	7,193	6.37
2007	27,239	243	7,319	7.14
2008	26,846	393	7,646	4.04
2009	26,220	545	5,879	4.20
2010	25,240	532	3,322	1.76
2011	24,417	426	1,870	-0.29
2012	23,502	332	1,511	0.17
2013	22,626	258	1,413	-0.75
2014	21,626	169	1,576	0.58

Table 1.4: **Regulatory capital management using ALLP_T1.** The table reports the propensity to have regulatory capital before ALLP below the 10% threshold and the probability of having accretive_ALLP_T1 in a bank-quarter. Each column presents the results for different bandwidths around the 10% threshold and alternative polynomial orders for the deficit of regulatory capital before ALLP. All variables are defined in Appendix A.1. Standard errors are clustered at the bank level. Robust t-values are reported below the coefficient estimates.

	Accretive_ALLP_T1				
	(1)	(2)	(3)	(4)	(5)
Low_RegCap_ALLP	0.076	0.056	0.076	0.043	0.036
	(5.575)	(5.338)	(5.262)	(4.993)	(4.262)
Def_RegCap_ALLP	2.097	0.067	5.776	-0.630	0.964
	(0.530)	(0.050)	(1.056)	(-0.762)	(1.217)
$Def\_RegCap\_ALLP^2$			1,101.421	20.254	34.075
			(1.068)	(0.516)	(0.922)
$Def\_RegCap\_ALLP \times Low\_RegCap\_ALLP$	-45.214	-20.586	-63.251	-11.941	-13.584
	(-4.889)	(-5.336)	(-4.726)	(-4.348)	(-5.277)
$Def\_RegCap\_ALLP^2 \times Low\_RegCap\_ALLP$			6,953.525	479.247	466.513
			(2.684)	(3.175)	(3.238)
Size	0.006	0.005	0.005	0.002	0.009
	(1.574)	(1.619)	(1.628)	(0.868)	(1.433)
Loan	-0.333	-0.336	-0.336	-0.338	-0.344
	(-9.511)	(-12.469)	(-12.484)	(-16.908)	(-14.463)
Public	0.003	-0.002	-0.002	0.009	0.019
	(0.358)	(-0.245)	(-0.262)	(1.545)	(1.628)
Asset_Quality	25.258	25.629	25.618	25.864	25.653
	(18.695)	(24.067)	(24.094)	(36.455)	(31.115)
Mgmt_Quality	-2.835	-5.241	-5.246	-6.503	-2.498
	(-1.400)	(-3.546)	(-3.553)	(-6.769)	(-2.442)
Earnings	-4.678	-6.897	-6.915	-6.437	-3.428
	(-2.523)	(-5.041)	(-5.060)	(-6.496)	(-3.339)
Liquidity	0.066	0.007	0.009	0.039	-0.026
	(0.552)	(0.091)	(0.106)	(0.715)	(-0.510)
Sensitivity_Mkt_Risk	2.323	5.753	5.719	3.292	2.694
	(0.898)	(2.888)	(2.873)	(2.411)	(1.794)
Observations	10,660	22,698	22,698	99,316	98,757
Adj R-squared	0.128	0.123	0.123	0.106	0.241
Polynomial Order	1	1	2	2	2
Sample	$\pm$ 0.25	$\pm$0.50	$\pm$0.50	$\pm$2	$\pm$2
Bank FE	No	No	No	No	Yes
Quarter-year FE	Yes	Yes	Yes	Yes	Yes
Supervisor FE	Yes	Yes	Yes	Yes	Yes

Table 1.5: **Regulatory capital management using ALLP_T2.** The table reports the propensity to have regulatory capital before ALLP below the 10% threshold and the probability of having accretive_ALLP_T2 in a bank-quarter. Each column presents the results for different bandwidths around the 10% threshold and alternative polynomial orders for the deficit of regulatory capital before ALLP. All variables are defined in Appendix A.1. Standard errors are clustered at the bank level. Robust t-values are reported below the coefficient estimates.

	Accretive_ALLP_T2				
	(1)	(2)	(3)	(4)	(5)
Low_RegCap_ALLP	0.031	0.027	0.031	0.019	0.017
	(3.600)	(4.323)	(3.338)	(3.598)	(3.208)
Def_RegCap_ALLP	4.037	-0.080	3.543	0.504	0.422
	(1.678)	(-0.102)	(1.059)	(1.387)	(1.111)
$Def\_RegCap\_ALLP^2$			698.856	8.393	0.851
			(1.140)	(0.518)	(0.050)
$Def\_RegCap\_ALLP \times Low\_RegCap\_ALLP$	-16.917	-4.603	-18.682	-1.531	-0.335
	(-2.888)	(-1.902)	(-2.070)	(-0.878)	(-0.188)
$Def\_RegCap\_ALLP^2 \times Low\_RegCap\_ALLP$			1,580.416	101.600	42.316
			(0.848)	(1.029)	(0.421)
Size	-0.004	-0.004	-0.004	-0.002	0.002
	(-2.055)	(-3.010)	(-2.995)	(-3.406)	(0.684)
Loan	0.025	0.028	0.028	0.036	0.067
	(1.476)	(2.074)	(2.079)	(5.864)	(6.386)
Public	-0.000	0.001	0.001	-0.001	0.005
	(-0.078)	(0.225)	(0.214)	(-0.453)	(1.194)
Asset_Quality	-4.606	-4.553	-4.555	-4.065	-6.644
	(-11.800)	(-15.002)	(-14.992)	(-25.378)	(-24.218)
Mgmt_Quality	1.741	1.797	1.793	1.811	2.046
	(1.740)	(2.454)	(2.447)	(5.308)	(4.319)
Earnings	1.094	0.693	0.683	0.946	0.463
	(1.100)	(0.922)	(0.908)	(2.311)	(0.921)
Liquidity	-0.085	-0.040	-0.039	-0.006	0.002
	(-1.658)	(-0.962)	(-0.952)	(-0.290)	(0.093)
Sensitivity_Mkt_Risk	-0.431	-0.447	-0.455	-0.387	-0.539
	(-0.292)	(-0.407)	(-0.415)	(-0.815)	(-0.685)
Observations	10,660	22,698	22,698	99,316	98,757
Adj R-squared	0.025	0.022	0.022	0.021	0.081
Polynomial Order	1	1	2	2	2
Sample	±0.25	±0.5	±0.5	±2	±2
Bank FE	No	No	No	No	Yes
Quarter-year FE	Yes	Yes	Yes	Yes	Yes
Supervisor FE	Yes	Yes	Yes	Yes	Yes

Table 1.6: **Regulatory capital management using RGL.** The table shows the relationship between regulatory capital before RGL and the probability of having accretive_RGL in a bank quarter. Each column presents the results for different bandwidths around the 10% threshold and alternative polynomial orders for the regulatory capital deficit before RGL. All variables are defined in Appendix A.1. Standard errors are clustered at the bank level. Robust t-values are reported below the coefficient estimates.

	Accretive_RGL				
	(1)	(2)	(3)	(4)	(5)
Low_RegCap_RGL	0.052	0.040	0.049	0.028	0.029
	(4.971)	(4.705)	(4.463)	(3.934)	(4.192)
Def_RegCap_RGL	-2.080	0.583	-0.613	1.039	0.573
	(-0.824)	(0.719)	(-0.185)	(2.437)	(1.277)
$Def\_RegCap\_RGL^2$			-232.629	30.264	17.505
			(-0.366)	(1.523)	(0.830)
$Def\_RegCap\_RGL \times Low\_RegCap\_RGL$	-16.917	-11.491	-21.869	-6.051	-5.330
	(-2.628)	(-4.244)	(-2.299)	(-2.991)	(-2.757)
$Def\_RegCap\_RGL^2 \times Low\_RegCap\_RGL$			2,741.943	200.867	204.281
			(1.489)	(1.717)	(1.789)
Size	0.010	0.007	0.007	0.005	0.010
	(5.021)	(5.346)	(5.328)	(7.156)	(3.496)
Loan	-0.222	-0.211	-0.211	-0.174	-0.174
	(-8.263)	(-10.908)	(-10.916)	(-18.365)	(-12.293)
Public	-0.006	-0.005	-0.005	-0.003	-0.001
	(-1.338)	(-1.377)	(-1.374)	(-1.627)	(-0.108)
Asset_Quality	0.487	0.235	0.232	0.275	0.601
	(0.876)	(0.553)	(0.546)	(1.252)	(1.826)
Mgmt_Quality	1.255	2.020	2.029	1.660	1.923
	(1.159)	(2.613)	(2.626)	(4.284)	(3.421)
Earnings	-4.044	-3.081	-3.082	-2.495	-0.431
	(-3.161)	(-3.692)	(-3.693)	(-6.005)	(-0.756)
Liquidity	-0.090	-0.129	-0.129	-0.133	-0.053
	(-1.175)	(-2.397)	(-2.390)	(-5.028)	(-1.645)
Sensitivity_Mkt_Risk	-1.870	-1.559	-1.572	-0.989	-0.946
	(-1.412)	(-1.480)	(-1.493)	(-1.831)	(-1.151)
Observations	10,912	23,214	23,214	100,060	99,533
Adj R-squared	0.084	0.069	0.069	0.056	0.115
Polynomial Order	1	1	2	2	2
Sample	±0.25	±0.5	±0.5	±2	±2
Bank FE	No	No	No	No	Yes
Quarter-year FE	Yes	Yes	Yes	Yes	Yes
Supervisor FE	Yes	Yes	Yes	Yes	Yes

Table 1.7: **Regulatory capital management using EqTS.** The table shows the relationship between regulatory capital before EqTS and the probability of having Accretive_EqTS in a bank-quarter. Each column presents the results for different bandwidths around the 10% threshold and alternative polynomial orders for the regulatory capital deficit before EqTS. All variables are defined in Appendix A.1. Standard errors are clustered at the bank level. Robust t-values are reported below the coefficient estimates.

	Accretive_EqTS				
	(1)	(2)	(3)	(4)	(5)
Low_RegCap_EqTS	0.220	0.265	0.210	0.314	0.288
	(12.871)	(20.038)	(11.444)	(26.469)	(25.278)
Def_RegCap_EqTS	51.470	35.500	66.834	24.084	23.570
	(7.973)	(15.679)	(7.852)	(22.541)	(23.175)
$Def\_RegCap\_EqTS^2$			6,126.907	842.323	753.241
			(4.038)	(18.570)	(17.211)
$Def\_RegCap\_EqTS \times Low\_RegCap\_EqTS$	-32.094	-44.317	-37.449	-43.254	-34.040
	(-2.559)	(-9.306)	(-2.049)	(-11.732)	(-9.954)
$Def\_RegCap\_EqTS^2 \times Low\_RegCap\_EqTS$			-14,319.347	-277.857	-444.560
			(-3.993)	(-1.366)	(-2.334)
Size	0.060	0.041	0.041	0.016	0.008
	(11.635)	(10.828)	(10.896)	(9.612)	(1.188)
Loan	0.474	0.358	0.360	0.162	0.026
	(8.903)	(9.161)	(9.182)	(8.409)	(1.071)
Public	0.043	0.050	0.050	0.022	0.039
	(3.089)	(4.858)	(4.871)	(4.397)	(3.479)
Asset_Quality	1.059	1.047	1.048	1.790	0.874
	(0.827)	(1.103)	(1.104)	(3.683)	(1.336)
Mgmt_Quality	-3.345	-1.920	-1.922	1.244	1.242
	(-1.349)	(-1.073)	(-1.072)	(1.352)	(1.218)
Earnings	-14.384	-13.810	-13.846	-11.470	-1.042
	(-5.615)	(-7.337)	(-7.347)	(-12.039)	(-0.953)
Liquidity	-0.358	-0.146	-0.143	-0.018	-0.057
	(-2.307)	(-1.407)	(-1.381)	(-0.368)	(-1.029)
Sensitivity_Mkt_Risk	3.473	1.751	1.704	-0.251	-2.043
	(0.926)	(0.637)	(0.618)	(-0.186)	(-1.255)
Observations	12,491	25,534	25,534	102,797	102,243
Adj R-squared	0.214	0.208	0.208	0.186	0.280
Polynomial Order	1	1	2	2	2
Sample	± 0.25	± 0.5	± 0.5	± 2	± 2
Bank FE	No	No	No	No	Yes
Quarter-year FE	Yes	Yes	Yes	Yes	Yes
Supervisor FE	Yes	Yes	Yes	Yes	Yes

Table 1.8: **Regulatory capital management using ARWA.** The table shows the relationship between regulatory capital before $ARWA$ and the probability of having $Accretive\_ARWA$ in a bank-quarter. Each column presents the results for different bandwidths around the 10% threshold and alternative polynomial orders for the regulatory capital deficit before $ARWA$. Because of data availability, the analysis for $ARWA$ starts in 2001. All variables are defined in Appendix A.1. Standard errors are clustered at the bank level. Robust t-values are reported below the coefficient estimates.

	Accretive_ARWA				
	(1)	(2)	(3)	(4)	(5)
Low_RegCap_ARWA	0.081	0.127	0.071	0.228	0.209
	(3.611)	(7.559)	(2.894)	(15.652)	(14.120)
Def_RegCap_ARWA	89.713	57.925	107.657	29.938	35.522
	(8.804)	(16.556)	(7.869)	(16.931)	(20.450)
$Def\_RegCap\_ARWA^2$	-98.540	-76.998	-113.310	-62.695	-66.697
	(-6.070)	(-11.752)	(-4.757)	(-12.636)	(-13.099)
$Def\_RegCap\_ARWA \times Low\_RegCap\_ARWA$			-12,323.252	-109.149	238.661
			(-2.550)	(-0.368)	(0.759)
$Def\_RegCap\_ARWA^2 \times Low\_RegCap\_ARWA$			9,385.368	1,119.842	932.721
			(3.751)	(13.659)	(11.505)
Size	-0.002	-0.021	-0.021	-0.029	-0.112
	(-0.326)	(-4.614)	(-4.570)	(-12.470)	(-8.585)
Loan	-0.333	-0.295	-0.292	-0.262	0.173
	(-4.501)	(-5.340)	(-5.281)	(-9.217)	(3.922)
Public	-0.016	-0.011	-0.010	-0.007	0.025
	(-0.877)	(-0.829)	(-0.795)	(-1.068)	(1.233)
Asset_Quality	4.069	3.646	3.596	6.743	11.308
	(2.342)	(2.882)	(2.843)	(10.557)	(11.639)
Mgmt_Quality	7.975	3.865	3.944	4.364	4.051
	(2.258)	(1.533)	(1.564)	(3.517)	(2.375)
Earnings	18.142	10.235	10.355	7.151	12.227
	(5.208)	(4.174)	(4.223)	(5.682)	(6.598)
Liquidity	-0.246	-0.255	-0.258	-0.553	-1.958
	(-1.149)	(-1.477)	(-1.499)	(-6.259)	(-17.609)
Sensitivity_Mkt_Risk	-9.555	-2.609	-2.625	0.914	-6.558
	(-1.783)	(-0.684)	(-0.690)	(0.487)	(-2.412)
Observations	6,820	14,756	14,756	64,814	64,295
Adj R-squared	0.075	0.097	0.098	0.066	0.117
Polynomial Order	1	1	2	2	2
Sample	± 0.25	±0.5	±0.5	± 2	±2
Bank FE	No	No	No	No	Yes
Quarter-year FE	Yes	Yes	Yes	Yes	Yes
Supervisor FE	Yes	Yes	Yes	Yes	Yes

Table 1.9: **Regulatory capital by periods.** The table shows the relationship between regulatory capital before the management and the probability of having Accretive $ALLP\_T1$, $ALLP\_T2$, RGL, $EqTS$, and $ARWA$ in a bank-quarter. Column (1) represents the 1996-1998 period (pre-Gramm-Leach-Bliley Act period), Column (2) represents the 1999-2009 period (until Basel III), and Column (3) represents the 2010-2014 period. Because of data availability, the analysis for $ARWA$ starts in 2001. All variables are defined in Appendix A.1. Standard errors are clustered at the bank level. Robust t-values are reported below the coefficient estimates.

	Accretive_X		
	(1)	(2)	(3)
Panel A			
$Low\_RegCap\_ALLP\_T1$	0.021	0.040	1E-04
	(1.433)	(4.039)	(0.003)
Observations	17,218	81,137	10,726
Adj R-squared	0.381	0.242	0.190
Panel B			
$Low\_RegCap\_ALLP\_T2$	-0.001	0.022	0.007
	(-0.065)	(3.692)	(0.614)
Observations	17,218	81,137	10,726
Adj R-squared	0.151	0.073	0.114
Panel C			
Low_RegCap_RGL	0.013	0.037	-0.002
	(1.549)	(4.274)	(-0.056)
Observations	17,377	81,774	11,097
Adj R-squared	0.099	0.121	0.205
Panel D			
Low_RegCap_EqTS	0.104	0.318	0.122
	(5.172)	(25.706)	(3.500)
Observations	17,444	84,396	11,743
Adj R-squared	0.232	0.291	0.234
Panel E			
Low_RegCap_ARWA		0.209	0.055
		(14.120)	(1.517)
Observations		64,295	11,389
Adj R-squared		0.117	0.120
Period	1996-1998	1999-2009	2010-2014
Polynomial Order	2	2	2
Sample	±2	±2	±2
Controls	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes
Quarter-year FE	Yes	Yes	Yes
Supervisor FE	Yes	Yes	Yes

Table 1.10: **Regulatory capital management using different cut-offs for accretive_X.** The table reports the relationship between having regulatory capital below 10% before accounting management and the probability of having accretive ALLP_T1 , ALLP_T2, RGL and EqTS in a bank quarter. Each column presents the results for different bandwidths around the 10% threshold and polynomial orders for the deficit of regulatory capital before accounting tools. All regressions include time-varying bank-level controls and bank, time and regulator fixed effects. Standard errors are clustered at the bank level. Robust t-values are reported below the coefficient estimates.

	Accretive_X					
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A						
$Low\_RegCap\_ALLP\_T1$	0.076	0.046	0.024	0.034	0.030	0.023
	(4.633)	(3.586)	(2.393)	(3.957)	(4.346)	(4.040)
Observations	10,660	22,698	98,757	10,660	22,698	98,757
Adj R-squared	0.202	0.194	0.368	0.091	0.089	0.149
Panel B						
$Low\_RegCap\_ALLP\_T2$	0.082	0.071	0.046	0.014	0.010	0.008
	(5.369)	(6.255)	(4.984)	(2.611)	(2.493)	(2.161)
Observations	10,660	22,698	98,757	10,660	22,698	98,757
Adj R-squared	0.063	0.060	0.178	0.012	0.011	0.056
Panel C						
Low_RegCap_RGL	0.085	0.052	0.040	0.031	0.027	0.024
	(5.753)	(4.712)	(4.340)	(4.312)	(4.375)	(4.637)
Observations	10,912	23,214	99,533	10,912	23,214	99,533
Adj R-squared	0.122	0.109	0.188	0.048	0.040	0.082
Panel D						
Low_RegCap_EqTS	0.233	0.265	0.287	0.199	0.258	0.284
	(13.566)	(19.681)	(25.031)	(11.920)	(20.003)	(25.159)
Observations	12,491	25,534	102,243	12,491	25,534	102,243
Adj R-squared	0.224	0.214	0.313	0.207	0.204	0.276
Panel E						
Low_RegCap_ARWA	0.058	0.087	0.168	0.075	0.142	0.219
	(2.907)	(5.722)	(12.149)	(3.108)	(7.954)	(14.321)
Observations	6,820	14,756	64,295	6,820	14,756	64,295
Adj R-squared	0.062	0.085	0.105	0.087	0.107	0.129
Cut-Off	0.01%	0.01%	0.01%	0.10%	0.10%	0.10%
Polynomial Order	1	1	2	1	1	2
Sample	± 0.25	±0.50	± 2	±0.25	±0.50	±2
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Bank FE	No	No	Yes	No	No	Yes
Quarter-year FE	Yes	Yes	Yes	Yes	Yes	Yes
Supervisor FE	Yes	Yes	Yes	Yes	Yes	Yes

Table 1.11: **Regulatory capital management and bank risk taking.** The table shows the effect of regulatory capital management on bank stability. $Accretive\_X$ is instrumented with $Low\_RegCap\_beforeX$, as defined in Equation 1.10. Each column presents the results for different bandwidths around the 10% threshold and alternative polynomial orders for the regulatory capital deficit before ALLP (Panels A and B), RGL (Panel C), or EqTS (Panel D). All variables are defined in Appendix A.1. The weak identification test for the first stage is calculated by Kleibergen-Paap Wald F-statistic version. Standard errors are clustered at the bank level. Robust t-values are reported below the coefficient estimates.

	Ln_ZScore				
	(1)	(2)	(3)	(4)	(5)
Panel A					
$Accretive\_ALLP\_T1$	-0.533	-1.577	-0.580	-2.560	-1.637
	(-1.489)	(-3.497)	(-1.474)	(-3.802)	(-2.961)
Observations	10,604	22,568	22,568	98,621	98,073
F-test (First stage)	30.05	28.96	26.00	24.58	18.40
Panel B					
$Accretive\_ALLP\_T2$	-1.306	-3.295	-1.411	-6.095	-3.583
	(-1.421)	(-3.168)	(-1.394)	(-3.035)	(-2.532)
Observations	10,604	22,568	22,568	98,621	98,073
F-test (First stage)	12.75	18.74	10.68	12.14	9.77
Panel C					
$Accretive\_RGL$	-0.751	-2.022	-0.838	-3.428	-1.663
	(-1.467)	(-3.122)	(-1.431)	(-3.123)	(-2.622)
Observations	10,841	23,051	23,051	99,325	98,807
F-test (First stage)	24.49	22.00	19.89	15.52	17.88
Panel D					
$Accretive\_EqTS$	0.053	-0.046	0.094	-0.093	-0.001
	(0.529)	(-0.711)	(0.844)	(-1.812)	(-0.031)
Observations	12,394	25,330	25,330	101,961	101,422
F-test (First stage)	167.63	400.61	132.94	699.89	628.5
Panel E					
$Accretive\_ARWA$	0.293	-0.164	0.251	-0.210	-0.150
	(0.777)	(-0.943)	(0.532)	(-2.369)	(-2.119)
Observations	6,793	14,699	14,699	64,492	63,983
F-test (First stage)	13.01	58.71	8.17	244.77	200.59
Polynomial Order	1	1	2	2	2
Sample	± 0.25	± 0.50	± 0.50	± 2	± 2
Bank FE	No	No	No	No	Yes
Quarter-year FE	Yes	Yes	Yes	Yes	Yes
Supervisor FE	Yes	Yes	Yes	Yes	Yes

Table 1.12: **Different tax specifications.** Panel (A) reports the relationship between having regulatory capital below the 10% threshold before accounting management and the probability of having accretive ALLP_T1 , ALLP_T2, and RGL in a bank quarter. We present three types of tax specifications: Graham & Mills (G&M), income tax rate (IT), and Damodaran's tax rate (τ). Standard errors are clustered at the bank level. Robust t-values are reported below the coefficient estimates. Panel (B) presents the number of bank-quarter observations considered to be part of any of the three accretive tools for the main sample.

Panel A: Regulatory capital management using different tax specifications

	Accretive_X		
	(1)	(2)	(3)
Panel A			
$Low\_RegCap\_ALLP\_T1$	0.022	0.043	0.078
	(2.433)	(5.108)	(12.009)
Observations	77,343	98,822	98,857
Adj R-squared	0.241	0.240	0.242
Panel B			
$Low\_RegCap\_ALLP\_T2$	0.017	0.028	0.064
	(2.706)	(4.686)	(10.372)
Observations	77,343	98,822	98,857
Adj R-squared	0.090	0.083	0.089
Panel C			
Low_RegCap_RGL	0.025	0.032	0.029
	(3.519)	(4.468)	(4.243)
Observations	78,011	99,506	99,546
Adj R-squared	0.115	0.114	0.107
Tax Specification	G&M	IT	τ
Polynomial Order	2	2	2
Sample	±2	±2	±2
Controls	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes
Quarter-year FE	Yes	Yes	Yes
Supervisor FE	Yes	Yes	Yes

Panel B: Number of observations using different tax specifications

Tax Specification	Accretive_ALLP_T1	Accretive_ALLP_T2	Accretive_RGL
Graham & Mills S-Corp w/IT	9,222	1,898	2,930
Graham & Mills	6,953	1,843	2,125
Income Tax Rate	9,320	1,918	3,047
Damodaran's Tax Rate (τ=0.2954)	9,071	2,579	2,735

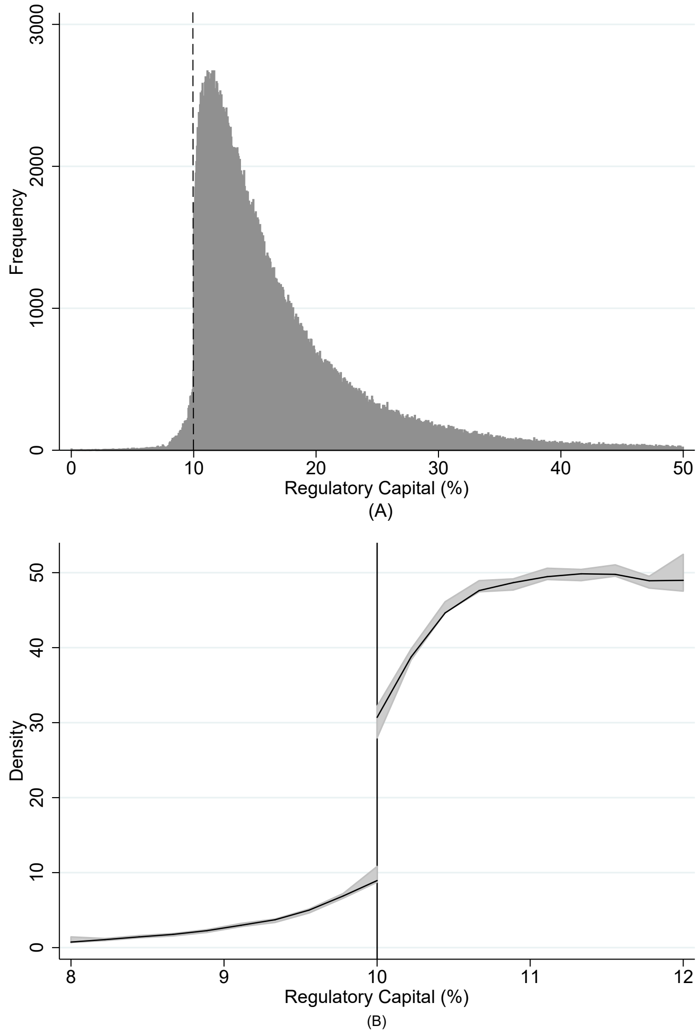
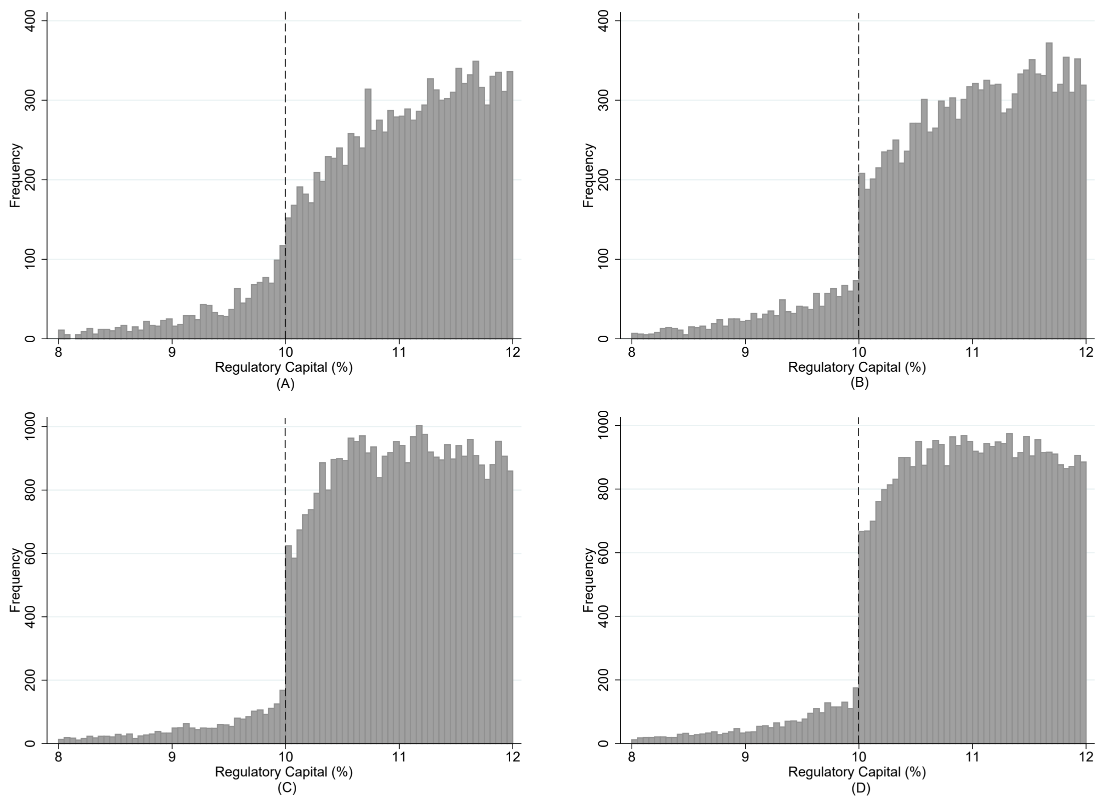
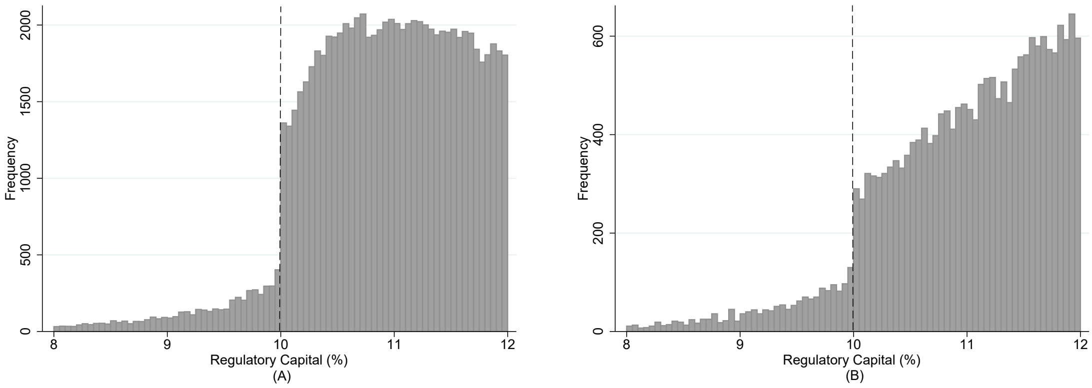


Figure 1.1: **Discontinuity around the 10% regulatory threshold.** Panel (A) plots the histogram of reported regulatory capital in the unrestricted sample, and Panel (B) plots the density function of reported regulatory capital for the interval (8% to 12%) for the main sample period (1996-2009). In Panel (A), interval widths from regulatory capital are 0.0005. In Panel (B), solid lines show the point estimates, and gray areas present the 95% confidence intervals. The t-statistic is 16.91 and is calculated using local polynomial density estimation (polynomial of order 2) (Calonico et al., 2014, 2017).



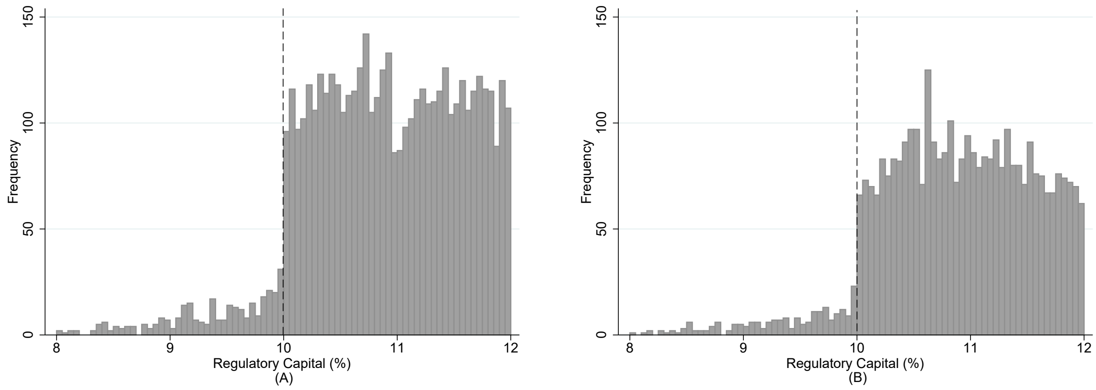
	1996-1999		2000-2009	
	Q1-Q3 (A)	Q2-Q4 (B)	Q1-Q3 (C)	Q2-Q4 (D)
Below 10%	117	73	168	175
Above 10%	152	208	624	667
Above/Below	1.30	2.85	3.71	3.81
χ^2 test	(A)-(B): 18.65	(B)-(D): 3.30	(A)-(C): 50.75	(C)-(D): 0.05
p-value	0.00	0.07	0.00	0.83
Calonico et al. T-Stat	1.72	7.89	13.48	11.37

Figure 1.2: **Distribution of regulatory capital for different reporting dates for assessment periods.** Panel (A) (Panel (B)) plots the histogram of reported regulatory capital for quarters 1 and 3 (2 and 4) before 2000, when the reporting date used to determine the capital component of the risk classification was six months before the beginning of the assessment period (quarters 2 and 4). Panel (C) plots the histogram of reported regulatory capital before 2000, when the reporting date used was one calendar quarter before the assessment period (quarters 1 and 3). The t-statistic is calculated using local polynomial density estimation (polynomial of order 2) (Calonico et al., 2014, 2017). The χ^2 test and p-value show whether the number of banks with regulatory capital above and below the threshold is different between the two adjacent histograms.



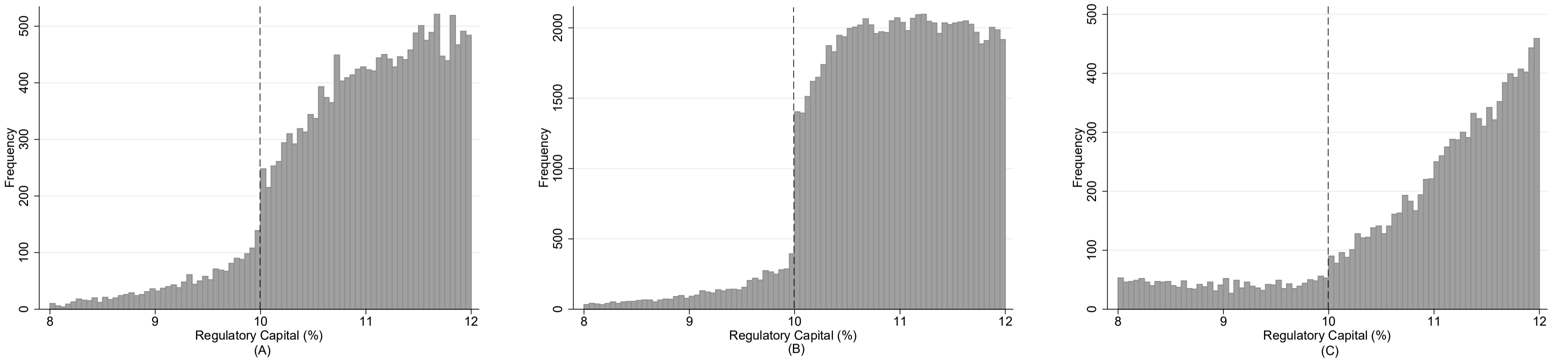
	BD (A)	NBD (B)
Below 10%	403	130
Above 10%	1361	290
Above/Below	3.38	2.23
χ^2 test	12.08	
p-value	0.00	
Calonico et al. t-statistic	16.19	5.88

Figure 1.3: **Discontinuity for banks that rely on brokered deposits and banks that do not.** Panel (A) plots the histogram of reported regulatory capital for banks that have positive brokered deposits in at least one quarter of our sample period, and Panel (B) plots the corresponding histogram for banks that have zero brokered deposits in every quarter of our sample. The t-statistic is calculated using local polynomial density estimation (polynomial of order 2) (Calonico et al., 2014, 2017). The χ^2 test and p-value show whether the number of banks with regulatory capital above and below the threshold is different between the two adjacent histograms.



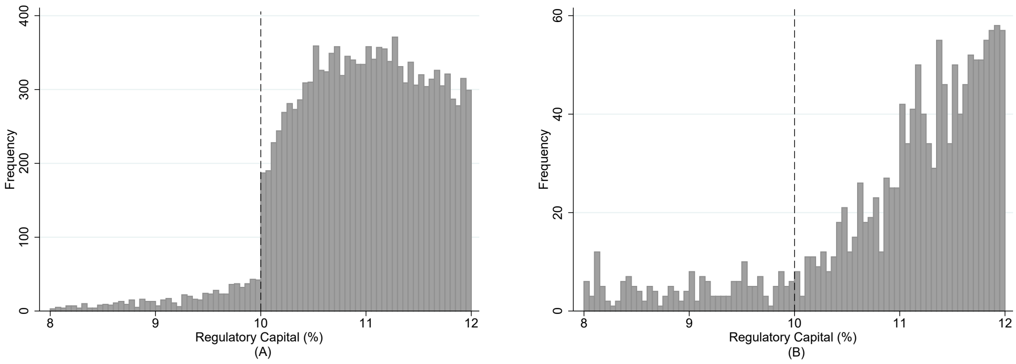
	Small Institutions (A)		Large Institutions (B)
Below 10%	31		23
Above 10%	96		66
Above/Below	3.10		2.87
χ^2 test		0.06	
P-value		0.81	
Calonico et al. T-Stat	5.86		4.62

Figure 1.4: **Discontinuity by banks' eligibility for 18-month examination.** Panel (A) plots the histogram of reported regulatory capital for banks eligible for expanded examination, and Panel (B) plots the histogram of reported regulatory capital for banks that have the standard 12-month examination. The sample period is 1997-2006. Interval widths from regulatory capital are 0.0005. The t-statistic is calculated using local polynomial density estimation (polynomial of order 2) (Calonico et al., 2014, 2017). The χ^2 test and p-value show whether the number of banks with regulatory capital above and below the threshold is different between the two adjacent histograms.



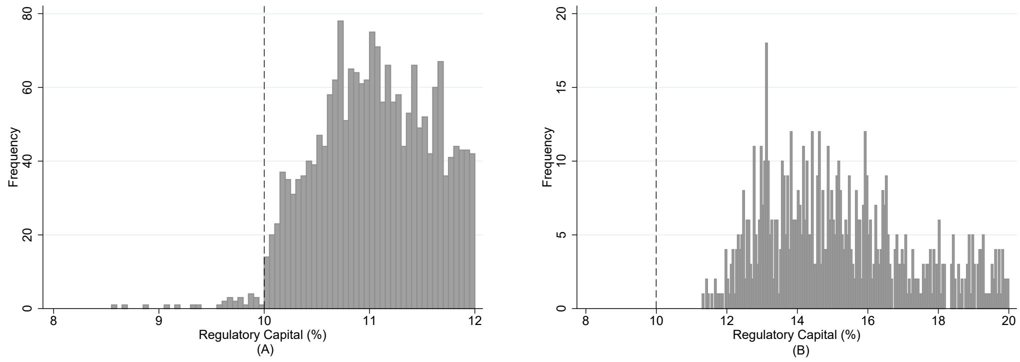
	1996-1998 (A)	1999-2009 (B)	2010-2014 (C)
Below 10%	139	394	53
Above 10%	248	1403	90
Above/Below	1.78	3.56	1.70
χ^2 test	(A)(B): 37.79	(B)(C): 17.12	(A)(C): 0.06
P-value	0.00	0.00	0.81
Calonico et al. T-Stat	2.58	17.77	2.19

Figure 1.5: **Discontinuity by subperiods.** The figures plot the histogram of reported regulatory capital for three subperiods. Plot (A) represents the 1996-1998 period (pre-Gramm-Leach-Bliley Act period), plot (B) represents the 1999-2009 period (until Basel III), and plot (C) represents the 2010-2014 period. The dotted vertical line shows the 10% regulatory capital threshold. Interval widths from regulatory capital are 0.0005. The t-statistic is calculated using local polynomial density estimation (polynomial of order 2) (Calonico et al., 2014, 2017). The table below the histograms reports the number of observations falling in the bin just below or above the 10% threshold of regulatory capital. The χ^2 test shows whether the number of observations just below relative to the number of observations just above the threshold is different in the adjacent histograms.



	1996-2009 (A)	2010-2014 (B)
Below 10%	42	6
Above 10%	187	8
Above/Below	4.45	1.33
χ^2 test	5.00	
P-value	0.03	
Calonico et al. T-Stat	5.81	-0.14

Figure 1.6: **Discontinuity for banks with MSR before and after the crisis.** Panel (A) plots the histogram of reported regulatory capital for banks with mortgage service rights (as of December 2009) for the period 1996-2009, and Panel (B) plots the histogram of reported regulatory capital for the same banks after the crisis (2010-2014). Interval widths from regulatory capital are 0.0005. The t-statistic is calculated using local polynomial density estimation (polynomial of order 2) (Calonico et al., 2014, 2017). The table below the histograms reports the number of observations falling in the bin just below or above the 10% threshold for regulatory capital. The χ^2 test shows whether the number of observations just below relative to the number of observations just above the threshold is different between the adjacent histograms.



	1996-2009 (A)	2010-2014 (B)
Below 10%	1	0
Above 10%	14	0
Above/Below	14.00	-
χ^2 test	-	
P-value	-	
Calonico et al. T-Stat	1.26	-

Figure 1.7: **Discontinuity for SIFIs before and after the crisis.** Panel (A) plots the histogram of reported regulatory capital for banks that belong to systemically important BHCs for the period 1996-2009, and Panel (B) plots the histogram of reported regulatory capital for the same banks after the crisis (2010-2014). Interval widths from regulatory capital are 0.0005. The t-statistic is calculated using local polynomial density estimation (polynomial of order 2) (Calonico et al., 2014, 2017). The table below the histograms reports the number of observations falling in the bin just below or above the 10% threshold of regulatory capital. The χ^2 test shows whether the number of observations just below relative to the number of observations just above the threshold is different between the adjacent histograms.

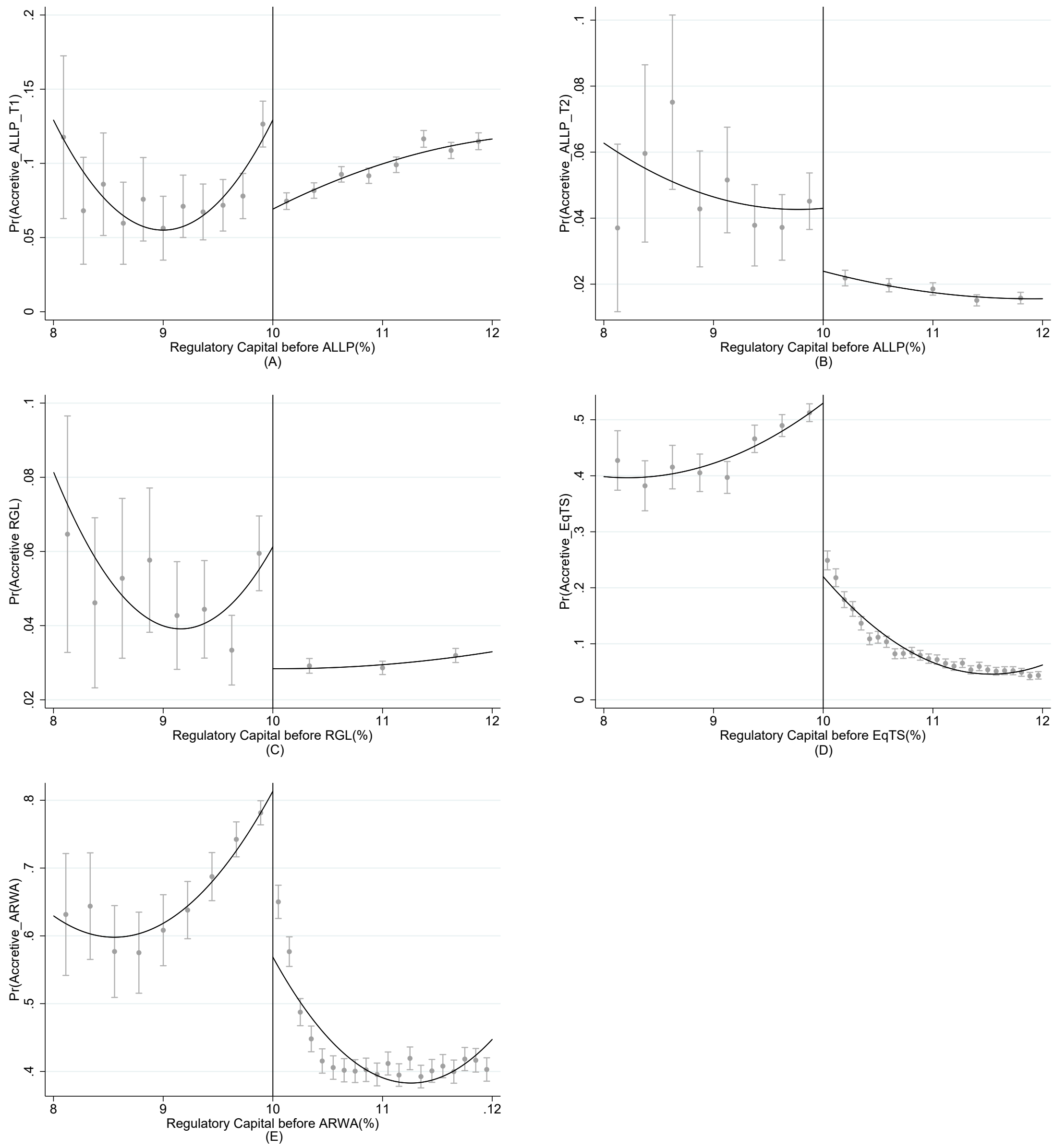


Figure 1.8: **Probability of regulatory capital management around the 10% threshold.** These plots exhibit the probability of having accretive ALLP_T1 (Panel (A)), ALLP_T2 (Panel (B)), RGL (Panel (C)), EqTS (Panel (D)) and ARWA (Panel (E)) as a function of the regulatory capital before ALLP, RGL, EqTS, and ARWA. We employ a data-driven approach to choose the number of bins on each side of the threshold, following Calonico et al. (2015)'s methodology. Dots represent the sample average within the bin, the vertical gray lines show the confidence intervals, and the black lines present a second-order polynomial regression curve. The black lines show the polynomial fit (order 2). T-statistics are -5.66, -3.12, -4.91, -5.51, and -2.18 respectively. They are calculated using local polynomial density estimation (polynomial of order 2) (Calonico et al., 2014, 2017).

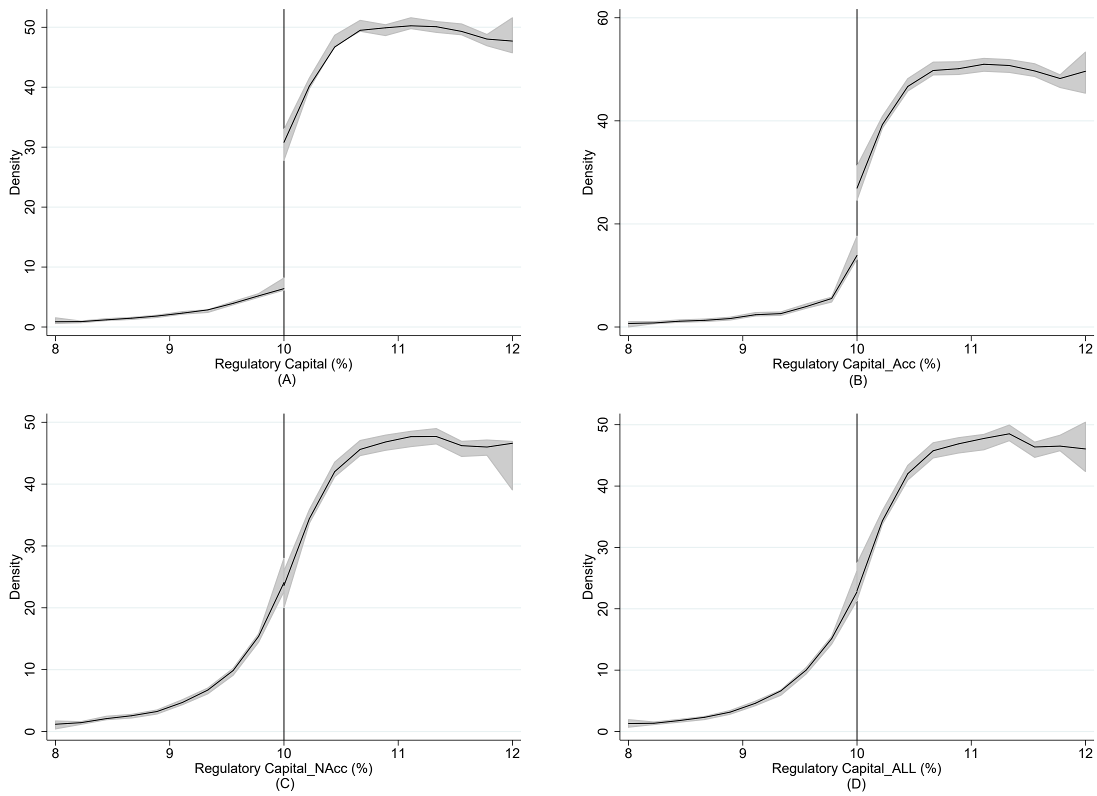
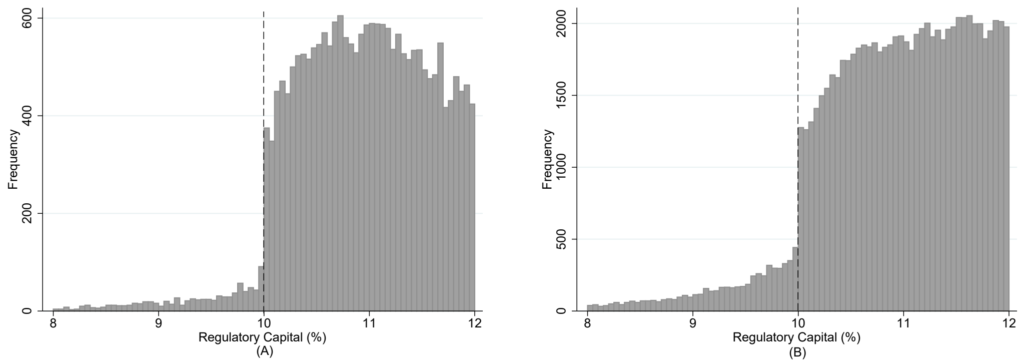


Figure 1.9: **Discontinuity around the 10% threshold of the adjusted regulatory capital.** Panel (A) plots the density function of reported regulatory capital. Panel (B) plots the density function of reported regulatory capital before accrual management (ALLP). Panel (C) plots the density function of reported regulatory capital before accrual and real management (ALLP and RGL). Panel (D) plots the density function of reported regulatory capital before accrual, real management and equity sales and transfers (ALLP, RGL, and EqTS). Solid lines show the point estimates, and gray areas present 95% confidence intervals. T-statistics are 16.48, 6.14, -1.13, 0.32, respectively. They are calculated using local polynomial density estimation (polynomial of order 2) (Calonico et al., 2014, 2017).



	Public (A)	Private (B)
Below 10%	91	442
Above 10%	375	1276
Above/Below	4.12	2.89
χ^2 test	7.64	
P-value	0.01	
Calonico et al. T-Stat	7.60	16.40

Figure 1.10: **Discontinuity for public and private banks.** The figures plot the histogram of reported regulatory capital for sample splits based on whether banks are publicly traded or private. Plot (A) ((B)) is for public (private) banks. The dotted vertical line shows the 10% threshold of regulatory capital. Interval widths are 0.0005. T-statistics are calculated using local polynomial density estimation (polynomial of order 2) (Calonico et al., 2014, 2017). The table below the histograms reports the number of observations falling in the bin just below or above the 10% threshold of regulatory capital. The χ^2 test and p-value show whether the number of observations just below the threshold relative to the number of observations just above the threshold is different between the adjacent histograms.

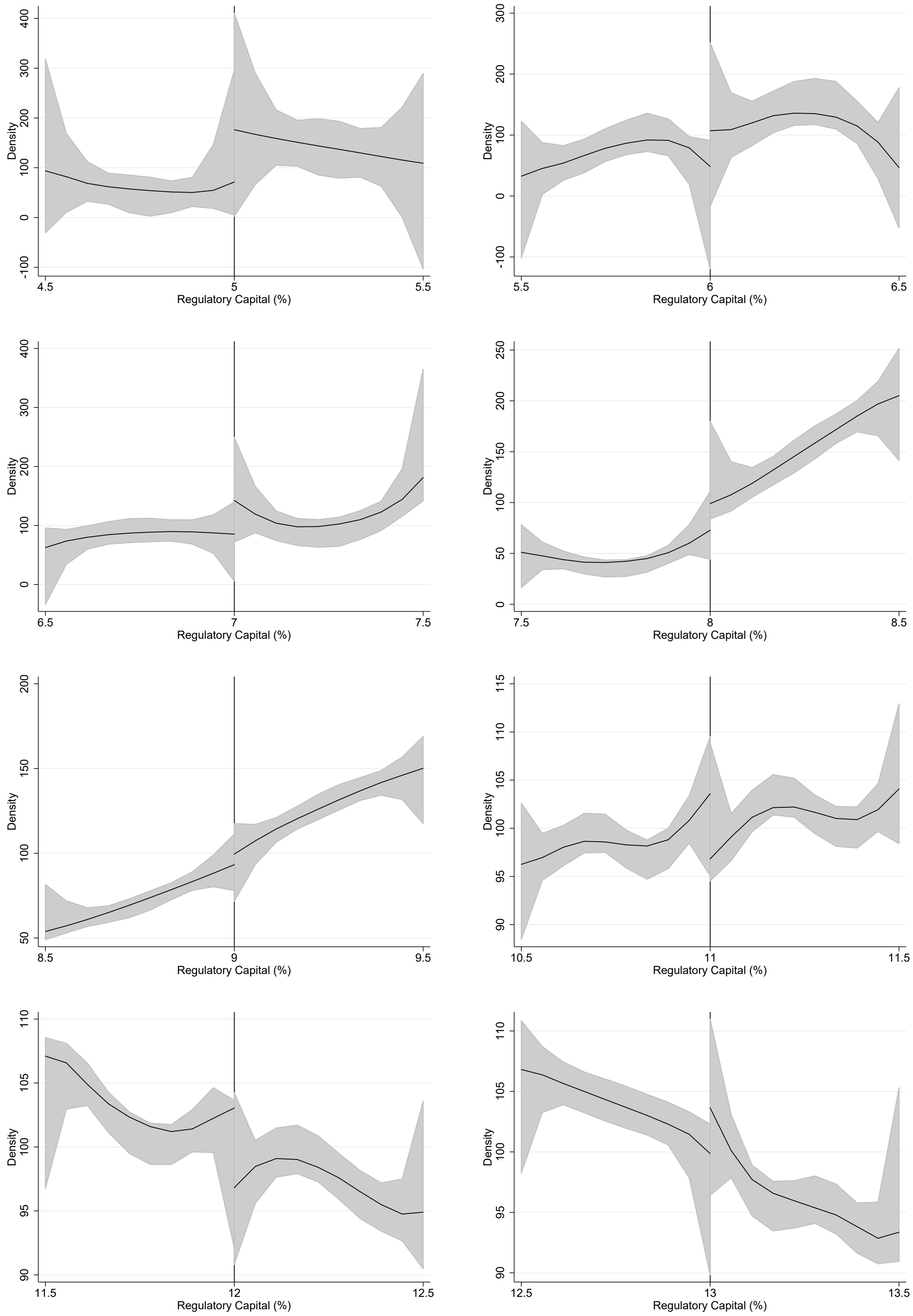


Figure 1.11: **Discontinuity around other integers.** The plots present the density function of regulatory capital in the $\pm$ 0.5% intervals around different integers (polynomial of order 2) (Calonico et al., 2014, 2017). The gray areas present the 95% confidence intervals around the fitted polynomial.

Chapter 2

The unintended consequences of external auditing in small private banks

Co-authored with Beatriz García Osma Osma.

2.1 Introduction

Do external auditors influence regulatory capital management in banks? We examine whether auditors affect bank managers' choices between accrual-based and real management to increase regulatory capital and whether these choices differ according to the stringency of regulatory scrutiny. The regulatory capital ratio is a key performance indicator in the banking industry, used by supervisors to evaluate banks' financial health and determine supervisory intervention in problem banks (Peek and Rosengren, 1996; Benston and Kaufman, 1997; Berger et al., 2001; Van den Heuvel, 2002). Thus, bank managers are expected to view ensuring sufficiently high regulatory capital as one of their top priorities, and may use accounting discretion to artificially inflate it. However, such practices may affect the reliability of financial reports, from which auditors provide insurance, and harm the safety and soundness of the financial system. This illustrates the important role of supervisors and external auditors as monitors.

Despite their seemingly converging objectives, the interaction between auditors and supervisors is far from obvious. While the auditor focuses on the reliability of financial reports, supervisors put more emphasis on financial stability. The extent to which their monitoring is complementary is therefore not clear. Understanding the role of the auditor is especially important to know how banks adjust their behavior in their presence, and how they choose among the available accounting-based and real instruments for managing regulatory capital.

External auditors provide an opinion about the fairness, transparency, and credibility of financial reports (Chaney and Philipich, 2002; DeFond and Zhang, 2014; Bertomeu et al., 2018; Ghosh et al., 2018). Thus, the audit acts as a monitoring mechanism over financial reporting quality. In addition, and unlike other firms, banks have federal and state supervisors as their primary monitoring agents, where federal supervisors are more stringent than state ones (Agarwal et al., 2014). Irrespective of their monitoring capacity, all supervisors rely on inputs from the accounting system in their examinations, and are generally concerned with financial statements quality (see, e.g., EBA, 2017). However, in the interest of protecting the safety and soundness of the financial system, supervisors monitoring extends beyond financial reporting, and they might particularly disapprove and deter real regulatory capital management practices.[1]

Therefore, significant overlap exists in terms of the activities both agents carry out to evaluate the performance, allowance for loan losses, and internal controls of banks (Nicoletti, 2018; Ghosh et al., 2018). However, it is not straight forward to predict the role of auditors and supervisors in limiting the use of accounting and real actions to manage regulatory capital, as these two agents interact and while they may partially coordinate to monitor the financial reporting process, they may also act in a non-coordinated manner, allowing for opportunistic behaviour from bank managers. This

[1] There is evidence that real management is more likely to affect firm performance compared to accruals management (Graham et al., 2005a; Cohen and Zarowin, 2010; Bhojraj et al., 2009).

begs the question of whether any free-riding may arise on the side of either of these agents if their several oversights are perfect substitutes.

There are at least three differences that would *a priori* separate their monitoring focus. First, auditors and supervisors differ in their preferred method to account for loan loss allowances. Supervisors favor the use of the expected loss model, that permits overstating impairments, facilitating subsequent income smoothing (Balla et al., 2012; Nicoletti, 2018; Garcia Osma et al., 2019). Second, it is not an auditors' responsibility to scrutinize business decisions. Auditors ensure that financial statements faithfully represent the real operations of the firm, but they are not required to assess the motivation underpinning manager's decisions. Finally, prior work suggests that managers can circumvent auditor oversight, particularly when accounting standards are principle-based or leave room for interpretation. Nelson et al. (2002) identify that when accounting standards leave interpretation scope or are imprecise, managers are more likely to attempt to convince the auditor that they have interpreted and followed the rules correctly, and auditors, in turn, are more willing to discuss on the interpretations. An example of this is SFAS 5 that has the "probable" term about the accrual recognition of losses.

The above reasons help us to build our prediction that banks do more real and accrual management when they self-select to audit, given the insurance that auditors provide on the quality of bank financial statements. In a setting in which the supervisor is stringent, we expect to find that banks are less able to do real regulatory capital management, unconditional on the choice of auditor. In this sense, strict supervisors moderate the effect of auditors on bank managers' choices of instruments to manage regulatory capital.

Despite the intuitive appeal of the above argumentation, a case could also be made for the alternative prediction. Prior accounting literature provides evidence that high audit quality reduces accruals management[2] and also, that auditor monitoring does not decrease the incentives to manage financial ratios. Therefore, when firms are con-

[2](Becker et al., 1998; Balsam et al., 2003; Krishnan, 2003; Cohen et al., 2008; Zang, 2012a)

strained by the auditor to use accruals, they are likely to switch to using real tools to meet their targets (Cohen and Zarowin, 2010; Burnett et al., 2012). This is because auditor monitoring increases the cost of using accruals (Zang, 2012a), as auditors are likely to require costly adjustments to the financial statements if they detect biases, or even to qualify their report if financial reporting is of low quality. Therefore, if auditors' monitoring focuses on the financial statements exclusively, the presence of an external auditor likely reduces the use of accruals to manage regulatory capital. This, in turn, may trigger the use of real actions. Therefore, keeping constant regulatory scrutiny and in the presence of an auditor, if banks' managers aim to manage the regulatory target, we should observe a greater use of real tools. The opposite holds for settings where banks have strict supervisors, where managers are expected to use real instruments less.

To test these predictions, we focus on accretive abnormal loan loss provision (ALLP) as a measure of accruals-based management. ALLP is the most critical accrual for banks. We use accretive realized gain and losses (RGL) on available for sale securities to measure real management actions. Our choice of proxies follows from our discussion. Real management is an intended action; in this case, the sale of securities to alter reported regulatory capital in a particular direction which might be sub-optimal, by altering the portfolio of bank assets. Accrual-based management, in turn, is achieved by changing the accounting estimates of loan loss provisions when presenting the financial statements. Tier 1 regulatory capital increases by understating loan loss provision or by realizing gains on available for sale securities. To link these accounting and real actions to regulatory capital pressures, we follow Orozco and Rubio (2020), who documents a regulatory-driven discontinuity around the 10% threshold of the capital ratio. We use this result as our empirical setting, and consider that banks have as main objective to keep regulatory capital above the 10% threshold. This is a salient threshold, as the Federal Deposit Insurance Corporation Improvement Act of 1991 (FDICIA) uses it to separate well-capitalized from adequately capitalized banks. Commercial banks that belong to the former category have access to some activities restricted for the latter (i.e., lower deposit insurance assessment rates, unrestricted access to brokered deposits, reduced supervision, and financial activities).

We base the analysis on small, private, and never enforced (SPNE) FDIC-insured commercial banks in the US for the period 1996 to 2009. SPNE banks represent more than 80% of the universe of commercial banks. However, there is limited evidence on these banks, as most prior research focuses on publicly listed banks. Private banks with less than $500 million in total assets may voluntarily opt to audit their financial statements. Because the supervisor can require an audit for any safety and soundness issues (Dahl et al., 1998), we exclude enforced banks. We exploit the discontinuity around 10% in regulatory capital to analyze the role of the auditor.

We report the following key findings. First, we find that the discontinuity in regulatory capital is present for audited and unaudited banks, but it is much larger for audited banks. The discontinuity around the 10% threshold is statistically significant using different bandwidth, nonparametric tests, and alternative polynomial orders (Calonico et al., 2014, 2017). This confirms the salience of this regulatory capital threshold documented in Orozco and Rubio (2020) in our empirical setting.

Second, we analyze the tools that SPNE banks use to increase their regulatory capital around the discontinuity. Using local polynomial density estimation, and compared to unaudited banks, we find that audited banks are more likely to exhibit accretive RGL when they are below the threshold before accounting for RGL. Interestingly, we also find that the probability of having accretive ALLP (provisioning less than expected to increase regulatory capital) discontinuously increases for audited banks that would have missed the 10% ratio of regulatory capital before ALLP. This evidence fails to supports the prediction that audited banks manage less through accruals, and suggests that banks that choose to audit their financial statements are, on aggregate, more suspect of managing their regulatory capital. The economic magnitude of these mechanisms is considerable: the probability of having accretive RGL or ALLP increases by more than 86% in the $\pm 0.25\%$ interval around the 10% threshold relative to the unconditional mean. These results are robust to alternative bandwidths and polynomial orders.

To ensure that banks that choose to be audited would fall below the threshold if they were not managing regulatory capital, we match banks below and above the threshold on size, type of bank, and state. In this matched sample, we find that audited banks below the threshold are more likely to exhibit accretive RGL and ALLP. Previous results suggest that banks that are similar in observables but would have missed the 10% threshold before the management, choose to have an auditor possibly as a signaling tool for the supervisor (to attract less attention). Previous literature finds that voluntary auditing reduces the cost of debt and have a signaling value that is lost when auditing is compulsory (Lennox and Pittman, 2011; DeFond and Zhang, 2014; Lo, 2015). We find that audited banks have 0.2% less probability of receiving an enforcement action from federal supervisors. The economic magnitude is considerable, 24%, relative to the unconditional mean. Furthermore, we match the sample to have comparable banks in terms of complexity, discretion, and bank type and state, differing in whether they are audited or not. We find that being audited significantly reduces the probability of enforcement on 0.24%. Later results reinforce the idea that banks choose to have an auditor because they provide insurance and servers to signal themselves as the good type to the supervisor.

To understand the influence of supervisors in banks' choices of regulatory capital management, we first document that banks with accretive RGL (ALLP) have a higher (lower) probability of receiving an enforcement action from the supervisor. This supports the idea that federal supervisors penalize real management and pay less attention to accruals-based management. Importantly, we expect that supervisory pressure may influence both managerial choices and, potentially, auditor oversight. A federal supervisor consistently examines national banks. However, state-chartered banks have federal and state supervisors that alternate their examinations. We rely on the inconsistency in supervisory scrutiny and external audit status, and we split the sample in banks that are state and nationally chartered. We find that audited state banks are more likely to have accretive RGL if pre-managed regulatory capital is just below the threshold. On the contrary, we find that audited national banks, which always have a strict supervisor, are significantly more likely to exhibit accretive ALLP but not accretive RGL.

Finally, we make use of the state-level regulatory index constructed by Agarwal et al. (2014), which identifies banks located in states with a relatively lenient or strict state supervisor. State banks that choose to be audited and have a lenient supervisor are more likely to exhibit accretive RGL when they are below the threshold, but when they have a strict supervisor, we do not find significant evidence of accretive RGL or ALLP. This suggests that audited banks avoid using real management to increase regulatory capital when there is greater regulatory scrutiny.

We contribute to the accounting literature by exploring the role of voluntary external audit in private banks. The evidence suggests that auditors' insurance on the quality of financial reports negatively affects banks' behavior. We also document a trade-off between real and accrual-based management to increase regulatory capital in settings in which the auditor and supervisor play different roles, shedding light over the under-explored relation between the supervisor and the external auditor. Results suggest that strict supervisors lower the negative unintended effect of the insurance role of auditors.

2.2 Institutional framework

2.2.1 Monitoring and interaction between supervisors and external auditors

Supervisors monitor United States banks according to the institution class they belong to. In particular, national banks are supervised only by a federal agency, the Office of the Comptroller of the Currency (OCC). State non-member banks are supervised jointly by the Federal Deposit Insurance Corporation (FDIC) and a state supervisor. Finally, state member banks and bank holding companies are supervised by the Federal Reserve Board (FRB) and a state supervisor. Additionally, the FDIC, as the insurer of the deposits, has a secondary authority over all banks.

Bank regulation and supervision intend to protect the safety and soundness of the financial system. For this, supervisors monitor banks relying on off and on-site examinations and, when necessary, initiate enforcement actions. Off-site examinations are done through the analysis of call-reports. These reports contain quarterly information on the financial health of the bank, including accounting information as the income statement, the balance sheet, and regulatory capital information, among others. On-site examinations occur every 12 or 18 months, where supervisors audit the information provided in call-reports, meet the bank managers, and gather additional non-accounting information, for instance, regarding bank's loan portfolio, internal controls, business operations (Agarwal et al., 2014). These examinations conclude with a confidential report and a CAMELS rating. The later is a weighted-average of six components that summarize banks conditions with respect to their *Capital Adequacy*, *Asset Quality*, *Earnings*, *Liquidity*, and *Sensitivity to Market Risk*.[3]

When supervisors find problems at banks, they can take informal or formal actions. Informal enforcement (including board resolutions, approved safety and soundness plans, and memorandum of understanding) are not legally binding and are not disclosed to the public. Supervisors take formal enforcement actions when they find banks under riskier or severe misconduct. Enforcement actions typically take place when the institution receives a CAMELS rating of 4 or 5, or at times 3 (Delis et al., 2016; Danisewicz et al., 2018; Curry et al., 1999). Supervisors use a variety of enforcement actions with institutions that have significant risk exposure and encourage them to take appropriate steps to mitigate risks (Curry et al., 1999). There are several banks' practices that could lead to enforcement action such as inadequate capital or loan loss reserves, poor quality or excessive growth of assets, fail to charge off loan losses, inadequate earnings, poor liquidity, insider payments, or failing to file call reports. Severe violations of enforcement actions may result in the termination of deposit insurance or

[3]The rating has a scale of 1 to 5, in which 1 is considered a satisfactory condition, and 5 represents an extreme level of regulatory concern. These ratings are strictly confidential, and the weights are set according to the personal judgment of the examiner.

bank liquidation.

Even though supervisors follow identical rules to evaluate banks, Agarwal et al. (2014) find inconsistencies in their application due to differences in their institutional design and incentives. In particular, they find that state supervisors are more lenient compared to federal supervisors. This is related to costly outcomes, such as higher failure rates. The discrepancy in supervisory behavior is related to different weights given to local economic conditions and, to some extent, differences in regulatory resources.

Regarding the role of external auditors, Section 36 of the Federal Deposit Insurance Act (FDIA) and Part 363 of the FDIC's regulations impose annual audit and reporting requirements on banks with \$500 million or more in consolidated total assets.[4] Publicly traded banks are also required to have externally audited financial statements by the Security Exchange Commission. Additionally, supervisors can require an external auditor for any safety and soundness issues (Dahl et al., 1998), and this comes typically as a consequence of an enforcement action. Therefore, small, private, never enforced (SPNE) banks are not required to have an external auditor, but they might choose to have one.

There are several reasons that explain why SPNE banks may voluntary choose to have an external audit. Prior literature explains the demand for audit arises from external parties such as debtholders demanding transparency, from the desire for accounting expertise, or banks' complexity reflected in the bank's size (Holod and Peek, 2007; Lo, 2015; Barton et al., 2015). Lo (2015) finds that reporting credibility granted by an external auditor is a crucial component for small banks to have access to uninsured funding.

The auditors' role is not only to determine whether the bank has violated an accounting standard but also is to provide assurance of the financial reporting quality (DeFond and Zhang, 2014). The audit opinion provides insurance that the financial statements are fairly presented in accordance with accounting rules, including a fairly representation of the banks underlying economics (FASB, 1980). DeFond and Zhang

[4]Section 36 was included in the FDIA by Section 112 of the FDICIA of 1991. These explain why the annual audit and reporting requirements are often referred to as the "FDICIA requirements."

(2014) highlight that high audit quality provides greater assurance of the financial reporting quality (for instance, lower accrual management) and that financial reporting is also a function of a firm's internal controls and innate characteristics.

Financial reporting quality will be low if banks abuse their discretion in accounting practices.[5] Prior work suggests that managers are able to circumvent auditor oversight, particularly when accounting standards are principle-based or leave room for interpretation. Nelson et al. (2002) find that when accounting rules are precise, managers structure transactions to meet accounting guidance, reducing the risk that the auditor will disagree. For instance, managers recognize accumulated unrealized gains on available for sale securities in a specific quarter by strategically selling the securities, complying with SFAS 115. Nelson et al. (2002) also identify that when accounting standards leave interpretation scope or are imprecise, managers are more likely to attempt to convince the auditor that they have interpreted and followed the rules correctly, and auditors, in turn, are more willing to discuss on the interpretations. An example of this is SFAS 5 that has the "probable" term about the accrual recognition of losses. SFAS 5 requires accrual recognition by a charge to income for an estimated loss from a contingency if two conditions are met: (i) information available prior to issuance of the financial statements indicates that it is *probable* that an asset had been impaired or a liability had been incurred at the date of the financial statements, and (ii) the amount of loss can be reasonably estimated.

From the previous discussion, it is clear that there exists a significant overlap in terms of the activities that supervisors and auditors carry out to evaluate the performance, allowance for loan losses, and internal controls of banks (Nicoletti, 2018; Ghosh et al., 2018). However, the joint role of auditors and supervisors in limiting the use of accounting and real actions to manage regulatory capital thresholds is not straightforward to predict, as these two agents likely interact and may partially coordinate to

[5]Such abuse was highlighted in the many cases of small bank failures during the saving and loans financial crisis. They where misleading financial statements and covering up financial difficulties (GAO, 1991; Lo, 2015).

monitor the financial reporting process. Since the saving and loan crisis, supervisors and auditors' relationship is less distant (Black, 1990; Dahl et al., 1998). The Financial Institution Reform, Recovery, and Enforcement Act of 1987 (FIRREA) requires the banks to provide copies of the supervisory reports to the external auditor.[6] The National Commission of Fraudulent Financial Reporting also suggests that the auditor gives the supervisor access to the management letter and bank management's response to improve communication and information flow. Furthermore, Section 33 of the FDIA requires banks to inform and send to the FDIC, the appropriate federal banking agency, and any appropriate state bank supervisor a copy of any management letter or other report issued by its independent accountant with respect to the institution and the audit services provided by the accountant within 15 days after receipt. The latter includes, for instance, any communication of significant deficiencies and material weaknesses in internal controls, any communication regarding matters that the accountant is required to communicate to the audit committee, or any change, dismissal, or resignation of the external auditor.

However, there are some differences in these agents' incentives. The first difference arises on the rationale to calculate for loan loss provisions (Balla et al., 2012; Nicoletti, 2018; Garcia Osma et al., 2019). The auditors' role is to restrict the use of judgmental, forward-looking information and to provide a strict interpretation of loan loss accounting standards, which delays the recognition of losses until objective information is available. The intention is to prevent banks from using loan loss provisions to smooth earnings that would not fairly represent banks' situation and reduce comparability. A bank could shift income from good quarters to bad quarters by taking large provisions when income is high and small provisions when income is low. Instead, supervisors prefer the use of a forward-looking approach. Overstating reserves, all else equal, enable the bank to absorb greater unexpected losses without affecting banks' health. From this perspective, smoothing earnings could reduce the asset volatility on bank capital

[6]Banks have to submit to their auditors a copy of the latest examination report, any supervisory memorandum of understanding, and any report of action enforced by a federal agency (Black, 1990).

and reduce procyclicality. The second difference is related to the scope of the responsibilities of the agents. It is not an auditors' responsibility to scrutinize business decisions. Auditors ensure that financial statements faithfully represent the real operations of the firm, but they are not required to assess the motivation underpinning manager's decisions. On the contrary, supervisors might deter real management actions. There is evidence that real management is more likely to affect firm performance compared to accruals management (Graham et al., 2005a; Cohen and Zarowin, 2010; Bhojraj et al., 2009).

2.2.2 Regulatory capital management

The total risk-based capital ratio or regulatory capital ratio is used broadly by supervisors to evaluate banks' financial health. It is composed of the sum of risk-based Tier 1 and Tier 2. After the Basel Capital Accord (Basel), Tier 1 is the core capital that includes common equity, perpetual preferred stock, and minority interest excluding intangibles, unrealized gains and losses on AFS securities, and loan loss reserves. Tier 2 is the secondary capital that includes loan loss reserves (up to 1.25% of risk-weighted assets), undisclosed reserves, and subordinated debt. Bank managers have some discretion when applying accounting rules, and they can use it to increase the reported regulatory capital. Accounting discretion may facilitate opportunistic or misguided behavior by managers that can reduce bank transparency and lead to other negative consequences (Bushman and Williams, 2012).

We explore both real and discretionary accrual choices made by managers to increase the capital ratio. While accrual-based capital management activities do not affect cash flows, real management activities are deviations from normal business practices and have direct consequences for cash flows and are more likely to affect firms' performance (Roychowdhury, 2006a; Cohen and Zarowin, 2010; Bhojraj et al., 2009). Moreover, accrual-based activities can be done at the end of or after the reporting period, while real management activities must be adjusted during the reporting period.[7]

Real management involves managing regulatory capital by entering into transactions that are reflected in financial reporting. Real earnings (or capital) management is not subject to ex-post scrutiny from auditors, and firms engage in this kind of management when their ability to exercise discretion over accruals is constrained (Cohen and Zarowin, 2010; Burnett et al., 2012). However, this type of strategic selling behavior might be more costly (Barth et al., 2017).

The FASB Accounting Standards Codification Topic 320 (ASC 320) created a new accounting treatment for AFS securities. ASC 320 requires AFS securities to be measured at fair value and changes in fair value to be recognized in other comprehensive income.[8] Therefore, unrealized gains and losses are not included in Tier 1. AFS securities are recognized as earnings only when realized (sold).[9] Consequently, banks can selectively sell their AFS securities to realized gains and increase Tier 1. An extra dollar in RGL on AFS securities increases Tier 1 by one unit minus the tax rate (see Barth et al. (2017) for further detail).

Loan loss provisions are a large accrual for commercial banks, and they are fundamental to banks' performance and health (Beatty and Liao, 2014). However, given that they are based on estimated loan losses, they are subject to significant discretion, and its estimation might be very volatile. Loan loss reserves is a contra-asset account that reduces loans. Loan loss provision increases the reserves and lowers reported earnings.

[7]Other ways of managing the regulatory capital ratio include, for instance, a reduction in risk-weighted assets (Duchin and Sosyura, 2014; Gropp et al., 2018) or loan sales, securitizations (Karaoglu, 2005), and the use of asset-backed commercial paper conduits (Kisin and Manela, 2016), but they are outside the scope of this paper.

[8]ASC 320 defines two other investment categories that, because of their accounting rules, do not create the opportunity to use discretionary accounting opportunistically to manage regulatory capital. The second category is equity and debt securities classified as *held for trading* is measured at fair value with changes in fair value (unrealized gains or losses) recognized in income. The third category of investment is *held to maturity*, which is measured at amortized cost, and changes in value are not recognized. Transfers between investment categories in most circumstances are not allowed. For more detail, see Bushman and Landsman (2010), Beatty and Liao (2014) and Barth et al. (2017).

[9]The security sales affect both the numerator and the denominator of the capital ratio. With the sale, there is a change in the composition of the risk-weighted portfolio, that is, the denominator. Unfortunately, we cannot trace the change in the portfolio's composition, and we, therefore, focus on the effect on the numerator.

Therefore, changes in loan loss reserves affect the regulatory capital ratio. An increase in loan loss provisions decreases Tier 1 because it reduces shareholders' equity. Loan loss reserves are excluded from Tier 1 because they have been created against identified losses and therefore are not freely available to meet unidentified losses that may subsequently arise, which is the essence of having regulatory capital (Beatty and Liao, 2014). Therefore, for each dollar that the bank is not provisioning (even though it should), Tier 1 increases by one unit minus the marginal tax rate. We use the abnormal component of loan loss provision to observe whether banks provision less than normal to manage regulatory capital, where the normal provision is estimated using the preferred Beatty and Liao (2014) model.[10]

Both instruments are costly, and banks trade-off real management versus accrual-based management as a function of their relative costliness. With the presence of the supervisor, for banks, it is more costly to do real management not only because they need to sell their securities when it might not be the optimal time but because supervisors perceive it as a riskier action. At the same time, when banks sell securities, the regulatory capital ratio is affected in the numerator through income and the denominator through risk-weighted assets. If they convert the securities into a less risky asset than the security they are selling, the increase in the ratio is more than one to one (without considering marginal tax rate). The opposite holds if they convert the security in a more risky asset. Using accruals to manage the target is less costly for the bank, particularly if financial statements are not audited. However, accruals have limited flexibility because they revert in the following periods. Previous accrual management activities constrain banks' ability to manage regulatory capital with accruals in the current period.

[10] Another way to manage regulatory capital is through Tier 2 that we do not exploit in this paper. Regulatory capital guidelines allow banks to add a proportion of them back as Tier 2. Loan loss reserves can be added back as capital up to a limit of 1.25% of the risk-weighted assets.

2.3 Variables definition and research design

2.3.1 Variables definition

The main variable of interest used along the paper is an audit indicator variable. $Audited$ takes the value one when the SPNE bank has audited financial statements in the year, and zero otherwise. Regulatory scrutiny is not observable directly as the information about the dates of examination, supervisory hours invested in each bank, and the results of the on-site examinations, CAMELS ratings, are not publicly available. We rely on previous literature that establishes that state supervisors are more lenient (assigns lower CAMELS) relative to federal supervisors (Agarwal et al., 2014). We define $NationalBank$ as an indicator variable that takes the value one when the institution is a national bank (only supervised by a federal agency, the OCC) and zero otherwise. We also use a state index constructed by previous authors, which estimates the difference in CAMELS ratings assigned by state versus federal (FDIC or FRB) supervisors in each state. They find that the higher is the index (state supervisors more lenient compared to federal supervisors), the riskier is the bank. We define $Lenient$ as an indicator variable equal to one if the bank is located at a state with the index above the median and zero otherwise similar to Nicoletti (2018).

The reported regulatory capital, $RegCap$, is measured as the sum of Tier 1 and Tier 2 capital normalized by risk-weighted assets. Besides, Low_RegCap is a dummy variable that is equal to one if $RegCap$ if below 10%, and zero otherwise.[11] We explore two accounting tools that banks can use to manage regulatory capital: i) RGL is calculated as realized gains and losses on available for sale securities normalized by risk-weighted assets like Barth et al. (2017). ii) $ALLP$ is estimated using the preferred Beatty and Liao (2014) model as a benchmark normalized by risk-weighted assets.[12] Then, we

[11] Orozco and Rubio (2020) find that there is a regulatory driven discontinuity at 10% of regulatory capital and that regulation affecting banks' incentives and ability to meet the threshold. We exploit this discontinuity to show auditors role in banks' incentives.

[12] This model has been widely used in accounting literature as a benchmark model (e.g., Jiang et al., 2016; Lim et al., 2016). Loan loss provisions are estimated as a function of the change in past, current and future nonperforming loans, bank characteristics, and macroeconomic variables (see Beatty and Liao, 2014, Model

estimate the "unmanaged" regulatory capital, absent of real and accrual management ($RegCap\_RGL$ and $RegCap\_ALLP$, respectively). In particular, we re-estimate the regulatory capital before RGL, discounting RGL net of taxes to RegCap, and regulatory capital before ALLP, adding ALLP net of taxes to RegCap.

In the spirit of Hribar et al. (2006) and Almeida et al. (2016) we identify RGL and ALLP that would have allowed banks to increase earnings and regulatory capital by at least 0.05%, as follows:

$$Accretive\_RGL = 1 \quad \text{if} \quad (1-\tau)RGL \geq 0.05\% \tag{2.1}$$

$$Accretive\_ALLP = 1 \quad \text{if} \quad (1-\tau)ALLP \leq -0.05\% \tag{2.2}$$

where $Accretive\_X$ is an indicator for executing Accretive RGL or ALLP to increase regulatory capital through Tier 1 and earnings by at least 0.05%. τ is the bank marginal tax rate.[13]

We hand-collect formal enforcement actions by the FDIC, OCC, and FRB to proxy for supervisory attention to banks (Danisewicz et al., 2018). We create a dummy variable, $Enforcement_Q4$, that takes the value one if there is an enforcement action against a bank in the following four quarters and zero otherwise. This variable is a noisy proxy of supervision because we only observe examinations that ended up in a formal enforcement action.[14] Informal enforcements are not disclosed to the public. Therefore, they are not included in the sample.[15]

Following previous literature, we include a set of control variables, $Controls_{i,t-1}$

(c), pp.366): $LLP_{i,t} = \alpha_0 + \alpha_1 \Delta NPL_{i,t+1} + \alpha_2 \Delta NPL_{i,t} + \alpha_2 \Delta NPL_{i,t-1} + \alpha_3 \Delta NPL_{i,t-2} + \alpha_4 Size_{i,t-1} + \alpha_5 \Delta Loan_{i,t} + \alpha_6 \Delta Unemployment_t + \alpha_7 \Delta GDP_t + \alpha_8 RealEstateIndex_t + \epsilon_{it}$.

[13]We estimate the banks' marginal tax rate following Graham and Mills (2008) specification except for S-corporations that I use the reported income taxes over income before taxes.

[14]Since Crime Control Act of 1990, formal agreements signed after November 29, 1990, must be made publicly available.

[15]See Appendix B, Section B.2, for more details on the matching procedure of enforcement actions.

(Beatty and Liao, 2014; Ng and Roychowdhury, 2014; Duchin and Sosyura, 2014; Lim et al., 2016; Barth et al., 2017; Berger et al., 2018; Delis et al., 2016; Gropp et al., 2018; Kandrac and Schlusche, 2018). $Size$ is the natural logarithm of total assets. $Loan$ is total loans normalized by total assets at the beginning of the quarter. Sd_ROA is the standard deviation of return on assets. Following Duchin and Sosyura (2014), Berger et al. (2018) and Delis et al. (2016), we include proxies of the CAMELS examination ratings.[16] As a proxy of asset quality, we use loan loss allowance LLA, management quality is proxy by $Noninterest\_Expenses$. We measure $NetIncome$ as a proxy for earnings and is income before taxes over lagged assets. As a proxy for liquidity, we use $Cash$, and sensitivity to market risk is proxy by $Noninterest\_Income$, all variables are normalized by the beginning of quarter total assets. All control variables are lagged. Because real and accruals management may substitutes each other (Zang, 2012a), we include the current value in each other regression. We also include available for sale securities, AFS, as a control in regressions involving RGL management, given that banks need to have AFS in advance to realize them.

2.3.2 Research design

To analyze the auditors' role in SPNE banks' choices between real and accrual-based management around the 10% threshold of regulatory capital, we use a local polynomial density estimation as follows:

[16] We do not use as a proxy of capital adequacy $RegCap$ because it is a variable of interest.

$$
\begin{aligned}
&Accretive\_X_{i,t} = \beta_1 Low\_RegCap\_X_{i,t} \times Aud + \beta_2 Audited + \beta_3 Low\_RegCap\_X_{i,t} \\
&+ \sum_{n=1}^{k} \beta_{4k} Def\_RegCap\_X^{k}_{i,t} \times Aud + \sum_{n=1}^{k} \beta_{5k} Def\_RegCap\_X^{k}_{i,t} \times Low\_RegCap\_X_{i,t} \times Aud \\
&+ \sum_{n=1}^{k} \beta_{6k} Def\_RegCap\_X^{k}_{i,t} + \sum_{n=1}^{k} \beta_{7k} Def\_RegCap\_X^{k}_{i,t} \times Low\_RegCap\_X_{i,t} \\
&+ \gamma Controls_{i,t-1} + \eta_{kt} + \varsigma_j + \lambda_i + \epsilon_{it}
\end{aligned}
\tag{2.3}
$$

where the dependent variable is $Accretive\_RGL$ or $Accretive\_ALLP$. We define the explanatory variable as the deficit (relative to the 10%) of regulatory capital before management $RegCap\_X$. Low_RegCap_X is a dummy variable that takes the value of one if the *unmanaged* regulatory capital is below the 10% level, and zero otherwise, and represents the discontinuity at the threshold (Roberts and Whited, 2013). The interaction between Low_RegCap_X and Def_RegCap_X allows the slopes of the regression functions to vary at both sides of the threshold. We interact the polynomial estimation with $Audited$, which allow us to disentangle the relation with accretive RGL or ALLP when the bank is below the threshold and is audited when the bank is below the threshold but unaudited and when the audited bank is above the threshold and does not have incentives to manage regulatory capital. We include as $Controls_{i,t-1}$ the same set previously mentioned. In all specifications, we include state-time fixed effects, η_{kt}, to account for time trends varying at the state level, supervisor fixed effects, ς_j, to account for permanent differences among federal supervisory agencies and bank fixed effects in broader intervals to account for permanent differences among banks, λ_i. We use three alternative bandwidths around the threshold, $\pm 0.25\%$, $\pm 0.5\%$, and $\pm 2\%$. For the broader intervals, we include second-order polynomials. For the smallest interval, we use a first-order polynomial (Roberts and Whited, 2013). Standard errors are clustered at the bank level.

We expect that the presence of an external auditor changes bank managers' behavior. If banks choose to have an auditor for the insurance that provides about the quality of the financial reports and managers are able to circumvent auditor's oversight because accounting standards leave room for interpretation, audited banks would use more accrual management compare to unaudited banks. However, if auditors are able to constrain the use of accrual management, audited banks would do less accrual management compare to unaudited banks and would turn to use more real instruments relative to accruals. In Eq. 2.3, β_1 is our main variable of interest and captures the incremental effect of accretive RGL or ALLP when banks are below the unmanaged regulatory capital threshold and have an external auditor. β_2 captures banks that are audited but are above the threshold and therefore do not have the incentives to manage regulatory capital, and β_3 captures the relation for banks that are not audited but are below the threshold and therefore have the incentives to manage regulatory capital upwards. $\beta_1 + \beta_3$ captures the total effect banks with audited financial statements that are below the unmanaged regulatory capital threshold.

A critical aspect of this setting is that the decision to be audited is endogenous. SPNE banks are choosing to have an external auditor. To asses whether banks that are below the 10% of unmanaged regulatory capital are choosing to be audited to receive insurance of the quality of their financial reports, we use propensity score matching. The latter helps to mitigate observable differences between audited and unaudited banks. We match each bank with Low_RegCap_X to a bank above the threshold on key characteristics, including bank size, bank type, and state, to have banks as similar as possible that differ in audit choice and incentives to manage regulatory capital.

Another factor that might affect banks' behavior in the presence of the auditor is the role of the other monitoring agent, the supervisor. If supervisors are strict they are more likely to deter actions that are risky for the bank's safety. First, we analyze what management choices are punished more heavily by the federal supervisor estimating the following regression:

$$
\begin{aligned}
Enforcement\_Q4 = {} & \beta_1 Accretive\_RGL_{i,t} + \beta_2 Accretive\_ALLP_{i,t} + \beta_3 Audited \\
& + \gamma Controls_{i,t-1} + \eta_{kt} + \varsigma_j + \epsilon_{it}
\end{aligned}
\tag{2.4}
$$

where the dependent variable is $Enforcement\_Q4$, and the variables of interest are $Accretive\_RGL$ and $Accretive\_ALLP$. We expect β_1 to be positive and significant, given that having accretive RGL implies selling securities at a point that might not be optimal. β_2 might be negative if the supervisor does not focus on accrual management.

Second, we test the effect of supervisory leniency and external audit status jointly. We rely on the evidence found by Agarwal et al. (2014) that federal supervisors are more stringent than state ones. National banks are consistently examined by the OCC. However, state charter banks have federal (FRB or FDIC) and state supervisors that alternate their examinations every 12 or 18 months. Taking into account the discontinuity of regulatory capital, we then split the sample into national and state banks and whether they are audited or not. Finally, we focus only on state-chartered banks and split the sample between lenient and strict supervisors to show the joint effects on banks' management behavior.

2.4 Sample and descriptive statistics

2.4.1 Sample

The data-set includes SPNE commercial banks from 1996 to 2009. We begin in 1996 because data on total risk-based capital is only available from 1996.[17] We collect quarterly accounting information from Call Reports retrieve from of Wharton Research Data Services (WRDS). Besides, we use hand-collect data on all formal enforcement actions imposed by the FDIC, OCC, and FRB on SPNE banks over the sample period. Along

[17]Because in the construction of some variables we use the lagged of a risk-based ratio we lose the first quarter of 1996. Therefore, the final sample period is 1996:Q2–2009:Q4.

the sample period, we have a total number of 1,910 formal enforcement (1,491 banks with at least one).

We drop banks with negative values of total assets and loans. We winsorize all continuous variables, except for regulatory capital, at the 1 and 99% level to reduce the influence of outliers. In the case of regulatory capital, we winzorize it at 0.1 and 99.9% level. These thresholds differ from the classical considered in the literature. However, if we winsorize at the 1% level, the minimum regulatory capital is above 8% and lose the variation coming from cases that are of interest to this paper. The sample contains 344,971 bank-quarter observations from 9,541 unique SPNE banks, out of which 7,616 choose to have at least one year of audited financial statements.

2.4.2 Descriptive statistics

Table 2.1 provides descriptive statistics of the variables included in the main tests. Panel A presents the summary statistics for the full sample of SPNE banks (Columns (1) to (4)) and a subsample restricted to banks that have a reported regulatory capital between 8 and 12% (Columns (5) to (8)). Panel B presents the summary statistics for the subsample of unaudited and audited banks restricted to observations that are around the reported regulatory capital between 8 and 12%.

Panel A shows that 58.4% of the sample have audited financial statements, but close to the threshold, 65.11% of the observations are audited. The mean $RegCap$ in the full sample is 17.71%, well above the 8% required by the Basel Committee and the 10% threshold, consistent with previous literature (see, for instance, Ng and Roychowdhury (2014), Barth et al. (1990); Orozco and Rubio (2020)). However, around 20% of the sample have a regulatory capital between 8 and 12%. The probability of having an enforcement action coming from federal supervisors is 0.6% for the full sample, but the sample close to the threshold is higher, 0.9%.

Panel B shows that banks with audited financial statements have significantly less reported regulatory capital compared to the rest of the banks. Banks with audited financial statements have significantly more $Accretive\_RGL$ than unaudited banks. Banks that choose to be audited have more of $Accretive\_ALLP$ compare to the ones that choose not to, but the difference is not significant. Interestingly, banks that are audited are more than 39% more likely to receive formal enforcement than unaudited banks. Banks with audited financial statements are significantly bigger, which is in line with bank size being a significant determinant for audit choice. The rest of the table presents summary statistics for other control variables. The figures are consistent with previous papers (Lo, 2015; Barton et al., 2015; Nicoletti, 2018). Finally, in Table 2.2, we present the Pearson and Spearman correlation matrix.

2.5 Results

2.5.1 The consequences of external auditing

As a first analysis, we examine the distribution of regulatory capital ratio for the sample of banks that are audited and unaudited. To observe the effect on banks' choices with the presence of the auditor, Figure 2.1 restricts the analysis to the ± 2 interval around the 10% threshold and formally evaluate the statistical significance of the discontinuity based on nonparametric tests (Calonico et al., 2014, 2017). Using local polynomial density estimation with robust standard errors, the figure reveals a sharp jump at the 10% threshold in both panels. Panel A shows that the discontinuity is statistically significant for unaudited SPNE banks (t-statistic 8.15). Panel B shows that the discontinuity for banks that chose to be audited is higher compared to unaudited (t-statistic 14.16). The latter result gives some indication that banks might be doing regulatory capital management to fall above the threshold in the case of both audited and unaudited banks, but especially in the audited ones.

This leads us to analyze whether and what tools audited banks use to increase their regulatory capital around the discontinuity. Following previous literature, we identify the real and accrual tools widely used in the banking industry: RGL (Barth et al.,

2017) and ALLP (Beatty and Liao, 2014; Ng and Roychowdhury, 2014). In particular, we analyze the relationship between having regulatory capital below 10% before using accounting discretion and the likelihood of using Accretive RGL or ALLP. Figure 2.2 provides the graphical evidence of $Accretive\_RGL$ and $Accretive\_ALLP$ for unaudited banks (Panel A and C) and audited ones (Panel B and D).[18] Panel A shows that the probability of having $Accretive\_RG$ is not significantly higher for unaudited banks that are below the threshold of the unmanaged regulatory capital (t-statistic -1.05). Panel B and D reveal a significant and strong jump at the threshold, suggesting that audited banks are more likely to exercise discretion to increase regulatory capital (t-statistic -4.22 and -5.06, respectively). Finally, Panel C shows that unaudited banks are significantly more likely to exhibit $Accretive\_ALLP$ when they are close but to the left of the 10% threshold of the unmanaged regulatory capital (t-statistic -2.01).

To analyze this relationship more formally, we present the results of estimating Eq. 2.3 in Tables 2.3 and 2.4. We explore the relationship between the *unmanaged* regulatory capital and the probability of having accretive RGL and $ALLP$ when banks choose whether to be audited or not. Column (1) presents the results for the ±0.25% interval around the 10% threshold (before adjustments) using a polynomial of order 1. In Columns (2) and (3), we use a broader interval, ± 0.5%, with a polynomial order of 1 and 2, respectively. In Columns (4) and (6), we provide the results using the ±2% interval and a polynomial of order 2. In particular, in Column (6), we provide the results of a matched sample above and below the threshold. We match each bank with Low_RegCap_X to a bank above the threshold on key characteristics, including asset size, bank type, and state. All specifications include state-time, and federal supervisors fixed effects. Expect for the smaller bandwidths (±0.25% and ±0.5%), and we also include bank fixed effects.

In Table 2.3, we show that being audited and having a deficit in regulatory capital

[18] We employ a data-driven approach to choose the number of bins at each side of the threshold, following Calonico et al. (2015)'s methodology. The gray vertical lines represent confidence intervals, and the black lines present a second-order polynomial regression curve. We use sharp regression discontinuity estimates using local second-order polynomial regression.

increase the probability of having $Accretive\_RGL$. All columns show that the differential effect of banks with Low_RegCap_RGL and $Audited$ financial statements is positive and significant. In Column (1), these SPNE banks are 6% more likely to engage in $Accretive\_RGL$, which its economic significance is huge 164.36% (unconditional mean of $Accretive\_RGL$ for the bandwidth is 3.65%). For banks that are not audited, but they do have a deficit in regulatory capital before the management, we do not find a significant relation with real management. Audited banks that have a surplus (relative to the 10% threshold) have an insignificantly lower probability of having $Accretive\_RGL$. The results are robust to the use of an alternative polynomial order and bandwidths. Finally, in Column (6), we present the results of the matched sample in the ± 2 around the regulatory threshold. Banks that have low regulatory capital before the management and choose to be audited are 5.1% more likely to exhibit $Accretive\_RGL$.

In Table 2.4, we show that being audited and having a deficit in regulatory capital increase the probability of under-provisioning loan losses to boost regulatory capital. Column (1) shows that the differential effect on banks with Low_RegCap_ALLP and $Audited$ is positive and significant. These banks are 7.8% more likely to engage in $Accretive\_ALLP$, which is economically large, 86.4% (mean of $Accretive\_ALLP$ for the bandwidth is 9%). Surprisingly, the probability of having $Accretive\_ALLP$ for banks that are not audited but are below the threshold is positive marginally significant only in Columns (3) and (6). We do not find a significant effect on audited banks that are above the 10% threshold, which is expected given that they do not have strong incentives to increase regulatory capital. Finally, in Column (6), we present the results of the matched sample in the ± 2 around the regulatory threshold. Banks that have low regulatory capital before the management and choose to be audited are 7% more likely to exhibit $Accretive\_ALLP$.

2.5.2 Auditors and supervisory leniency

In the previous section, we show that banks that choose to be audited and have the need to increase regulatory capital are more likely to employ real and accrual discretion to meet the target keeping constant regulatory scrutiny. In this section, we incorporate to previous analysis supervisory leniency. In this sense, if supervisors are strict, they are going to prevent or deter banks from carrying out activities that they consider risky. First, we show what actions federal supervisors penalize the most. Table 2.5 presents the probability of receiving an enforcement action in the following year from a federal supervisor as a function of bank characteristics and $Accretive\_RGL$ and $Accretive\_ALLP$. Column (1) presents the results for the full sample, while Column (2) shows the results only for state banks that, on average, have less supervisory scrutiny. Column (3) shows the results only for national banks that consistently have more supervisory scrutiny (Agarwal et al., 2014). Finally, Column (4) presents the probability of having enforcement action for a matched sample on observable characteristics and Accretive RGL and ALLP for banks that only differ on whether they are audited. Results of the matching procedure are presented in the Appendix B. In all specifications, we include state-time fixed effect and in Columns (1), (2), and (4) federal supervisor fixed effect.[19]

In Column (1), we find that the probability of receiving an enforcement action is significantly higher for $Accretive\_RGL$ and lower for $Accretive\_ALLP$. Federal supervisors penalize banks that are doing real management and do not seem to focus on accrual management. Interestingly, Column (2) shows that having $Accretive\_RGL$ increases the probability of receiving an enforcement action is positive, 0.2%, for state-chartered banks but not significant. The later is in line that state-chartered banks have, on average, more lenient supervision compared to national banks. Column (3) shows that having $Accretive\_RGL$ increases the probability of receiving an enforcement action by 0.9% for nationally-chartered banks (the economic significance is 44.1%). The differ-

[19]We do not include bank fixed effect as our dependent variable does not present enough variability within the firm. For the sub-sample of national banks (Column (3)) we do not include supervisor fixed effects because they are only supervised by the OCC.

ential effect between these two coefficients is 0.65%, but it is not significant (t-statistics 1.25).[20] In consistence with supervisors having as a key pillar capital adequacy and earnings, we find that the lower is the regulatory capital and net income, the higher is the probability of having enforcement. Consistently with banks' complexity, $Size$ is positively correlated with enforcement actions for state banks.

Interestingly, we find that audited banks have less probability of receiving an enforcement action from federal supervisors. In Column (1), the economic magnitude is considerable; the probability of receiving an enforcement action decreases in 9.5% if the bank is audited relative to the unconditional mean of enforcement 2.1%. This result reinforces the argument that banks choose to have an auditor as a signaling tool for the supervisor (to attract less attention). In Column (4), we further explore this result with a matched sample in an effort to have comparable banks in terms of complexity, discretion, and other characteristics, only differing in whether they are audited or not. We find that being audited reduces the probability of enforcement on 0.24%.

In Table 2.6, we proceed to test the jointly the effect of supervisory leniency and audit status on the probability of having $Accretive\_RGL$ and $Accretive\_ALLP$ for banks between 8 and 12% of unmanaged regulatory capital. Taking into account the discontinuity of regulatory capital, we split the sample into state (Columns (1) and (2)) and national banks (Columns (3) and (4)) and whether they are audited or not for the sample of SPNE banks. For the sub-sample of state-chartered banks, audited and low regulatory capital banks are 5.5% more likely to have $Accretive\_RGL$; the relation with $Accretive\_ALLP$ is also positive and significant (Columns (1) and (2)). For the sub-sample of national banks, audited and low regulatory capital banks are 12.4% more likely to have $Accretive\_ALLP$. However, the relation with $Accretive\_RGL$ is not significant (Columns (4) and (3), respectively). Later results are consistent with the presence of a trade-off between the use of discretionary tools. Banks that have relatively

[20]In untabulated results, we rerun this regression for Accretive RGL and ALLP with a 0.1% cut-off. We find that magnitudes are bigger, and the differential effect of being nationally-chartered and having Accretive RGL is positive (1.5%) and significant (t-statistics 2.11).

more supervisory scrutiny employ discretionary accrual instruments instead of real management.

Unaudited banks do not present significantly more $Accretive\_RGL$ or $Accretive\_ALLP$ when banks are SPNE and have low regulatory capital before the management.[21]

Finally, in Table 2.7, we focus only on state-chartered banks, and we split the sample between lenient and strict supervisors to show the joint effects on banks' management behavior. For the sub-sample of banks with low regulatory capital and audited financial statements with lenient supervisor, we find that they are 5.9% more likely to exhibit $Accretive\_RGL$ (Column (1)), but this relation is marginally significant and lower if the state supervisor is strict (Column (3)). For unaudited SPNE banks, we do not find any significant effect.

2.6 Conclusions

We provide evidence that small, private, never enforced banks with audited financial statements are more likely to use accounting discretion than unaudited banks. We build our study in a setting in which there is a discontinuity around the 10% threshold of regulatory capital, and banks have incentives to use discretion to fall above it. In particular, we focus on how does the presence of an external auditor affects banks' choices and how does it varies if we incorporate supervisory scrutiny in the analysis. Contrary to what is expected, we find evidence that there is a negative effect of external auditors on banks' behavior: banks use more real and accruals instruments to manage regulatory capital. These results are relevant for understanding how external audits and the insurance that they provide affect banks' behavior. In the presence of a strict supervisor, there is a trade-off in banks' choices between real and accrual-based management. In the latter case, audited banks engage more in accrual regulatory capital management rather than real management. Taken together, the evidence suggests that banks are choosing to be

[21] Column (2) shows that SPNE banks with unaudited financial statements have significantly more $Accretive\_ALLP$ when regulatory capital is low, this result is not robust to alternatively specifications in terms of bandwidths or polynomial orders.

audited to do more regulatory capital management, and auditors' independence is challenged.

Table 2.1: **Summary statistics.** The table shows descriptive statistics for commercial banks used in this paper. Sample period 1996–2009. Panel A presents summary statistics for the full and reduced sample of small, private and never enforced banks. Panel B provides a comparison between banks that have and do not have audited financial statements restricting the interval to ±2% around the 10% threshold of regulatory capital. All variables, except for $Size$, are multiplied by 100 for expositional convenience. All variables are defined in Appendix B.

Panel A: Summary statistics

	Full sample				RegCap ±2			
	Obs	Mean	Median	S.D.	Obs	Mean	Median	S.D.
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Audited	344971	58.42	100.00	49.29	69141	65.11	100.00	47.66
RegCap	344971	17.71	15.23	8.33	69141	10.93	11.00	0.73
Accretive_ALLP	344971	6.98	0.00	25.48	69141	3.19	0.00	17.58
Accretive_RGL	344971	1.64	0.00	12.72	69141	1.14	0.00	10.61
Enforcement	344971	0.55	0.00	7.42	69141	0.87	0.00	9.28
ALLP	344971	-0.02	-0.05	0.19	69141	0.01	-0.04	0.22
LLP	344971	0.07	0.03	0.14	69141	0.09	0.05	0.17
RGL	344971	0.01	0.00	0.03	69141	0.00	0.00	0.03
AFS	344971	19.73	17.96	14.47	69141	12.96	11.96	9.36
LLA	344971	0.90	0.83	0.43	69141	0.94	0.88	0.37
Non Interest Expenses	344971	0.82	0.77	0.32	69141	0.85	0.80	0.30
Net Income	344971	0.32	0.37	0.32	69141	0.29	0.34	0.34
Cash	344971	5.21	4.02	4.29	69141	4.57	3.77	3.13
Non Interest Income	344971	0.20	0.16	0.19	69141	0.21	0.17	0.19
Sd_ROA	344971	0.13	0.07	0.30	69141	0.13	0.06	0.34
Loan	344971	63.22	64.50	15.92	69141	75.56	75.96	10.78
Size	344971	11.21	11.23	0.89	69141	11.59	11.63	0.82
NPL	344971	0.71	0.39	0.97	69141	0.77	0.43	1.05

Panel B: Unaudited vs. audited banks around the 10% threshold

	Unaudited		Audited		T-Stat
	Obs	Mean	Obs	Mean	
	(1)	(2)	(3)	(4)	(5)
RegCap	24,126	10.94	45,015	10.92	2.16
Accretive_ALLP	24,126	3.10	45,015	3.24	-1.00
Accretive_RGL	24,126	0.95	45,015	1.24	-3.51
Enforcement	24,126	0.69	45,015	0.96	-3.73
ALLP	24,126	0.01	45,015	0.01	-1.60
LLP	24,126	0.08	45,015	0.10	-17.49
RGL	24,126	0.00	45,015	0.00	-7.42
AFS	24,126	12.89	45,015	13.00	-1.45
LLA	24,126	0.91	45,015	0.96	-17.41
Non Interest Expenses	24,126	0.82	45,015	0.87	-18.32
Net Income	24,126	0.31	45,015	0.28	14.52
Cash	24,126	4.59	45,015	4.56	1.47
Non Interest Income	24,126	0.20	45,015	0.22	-18.10
Sd_ROA	24,126	0.13	45,015	0.12	0.88
Loan	24,126	75.05	45,015	75.83	-9.07
Size	24,126	11.15	45,015	11.83	-110
NPL	24,126	0.77	45,015	0.76	0.80

Table 2.2: **Correlation matrix**. The table shows the Pearson (Spearman) correlations below (above) the diagonal. Sample period 1996–2009. All variables are defined in Appendix B.

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
(1)	Audited		-0.17	0.00	0.00	0.01	0.02	-0.05	0.19	0.05	-0.05	0.05	0.11	-0.04	0.17	-0.12	0.14	0.46	0.26	-0.01
(2)	RegCap	-0.14		0.05	0.10	0.03	-0.04	-0.10	-0.28	-0.03	0.28	-0.18	-0.11	0.09	-0.17	0.09	-0.60	-0.38	-0.20	-0.11
(3)	Net Income	-0.03	0.04		0.02	0.00	-0.05	-0.16	-0.13	0.01	0.00	0.04	-0.21	-0.02	0.17	-0.22	0.01	0.14	0.12	-0.11
(4)	Accretive_ALLP	0.00	0.11	0.03		0.03	0.01	-0.40	-0.12	0.02	0.07	0.17	-0.03	0.01	-0.02	0.05	-0.10	0.03	0.00	0.02
(5)	Accretive_RGL	0.01	0.03	-0.01	0.03		0.01	-0.02	0.01	0.28	0.09	-0.03	0.00	-0.01	-0.01	0.07	-0.07	0.01	-0.01	0.02
(6)	Enforcement	0.02	-0.03	-0.09	0.01	0.01		0.03	0.04	0.01	-0.02	0.05	0.02	0.00	0.00	0.06	0.02	0.03	0.00	0.06
(7)	ALLP	0.00	-0.07	-0.47	-0.25	0.02	0.06		0.36	-0.05	-0.17	0.19	0.15	0.04	0.02	0.20	0.20	-0.19	-0.06	0.23
(8)	LLP	0.09	-0.09	-0.25	-0.01	0.03	0.08	0.39		0.05	-0.19	0.22	0.16	-0.03	0.12	0.12	0.36	0.22	0.09	0.22
(9)	RGL	0.03	0.01	0.03	0.03	0.76	0.01	0.00	0.03		0.11	-0.03	-0.01	-0.03	0.02	-0.02	-0.03	0.10	0.04	0.03
(10)	AFS	-0.06	0.26	0.03	0.08	0.10	-0.02	-0.15	-0.15	0.11		-0.23	-0.16	-0.10	-0.03	-0.09	-0.56	0.01	-0.03	-0.08
(11)	LLA	0.04	-0.12	-0.07	0.15	-0.02	0.07	0.27	0.40	-0.03	-0.21		0.11	-0.03	0.03	0.14	0.41	0.05	0.09	0.29
(12)	Non Interest Expenses	0.11	-0.01	-0.18	-0.03	0.00	0.02	0.16	0.23	0.00	-0.16	0.18		0.31	0.51	0.22	0.14	-0.12	-0.03	0.06
(13)	Cash	-0.04	0.12	-0.06	0.03	0.00	0.00	0.00	0.01	-0.01	-0.13	-0.02	0.23		0.18	0.10	-0.15	-0.21	-0.07	-0.04
(14)	Non Interest Income	0.14	-0.02	0.13	-0.02	0.00	0.01	0.09	0.16	0.00	-0.07	0.11	0.64	0.14		-0.02	0.05	0.22	0.15	0.07
(15)	Sd_ROA	0.00	0.01	-0.04	0.02	0.01	0.01	0.03	0.06	0.00	0.00	0.04	0.05	0.02	0.03		0.00	-0.26	-0.10	0.17
(16)	Loan	0.14	-0.58	-0.02	-0.10	-0.07	0.02	0.15	0.21	-0.06	-0.58	0.34	0.11	-0.17	0.01	0.00		0.25	0.11	0.14
(17)	Size	0.44	-0.30	0.10	0.03	0.01	0.03	-0.06	0.12	0.04	-0.02	0.05	-0.07	-0.17	0.22	0.00	0.23		0.37	0.07
(18)	Public	0.26	-0.14	0.07	0.00	-0.01	0.00	-0.01	0.06	0.00	-0.04	0.08	0.01	-0.05	0.15	0.01	0.11	0.45		0.00
(19)	NPL	-0.01	-0.09	-0.30	0.02	0.04	0.11	0.38	0.37	0.03	-0.12	0.40	0.08	-0.01	0.01	0.03	0.13	0.01	-0.03	

Table 2.3: **Regulatory capital management using RGL in the presence of the auditor.** The table reports the propensity to have regulatory capital before RGL below the 10% threshold and audited financial statements and the probability of having Accretive_RGL in a bank-quarter. Each column presents the results for different bandwidths around the 10% threshold and alternative polynomial orders for the deficit of regulatory capital before RGL. All variables are defined in Appendix B. Standard errors are clustered at the bank level. Robust t-values are reported below the coefficients.

	Accretive_RGL					
	(1)	(2)	(3)	(4)	(5)	(6)
$Low\_RegCap\_RGL \times Audited$	0.060	0.046	0.059	0.036	0.035	0.051
	(2.314)	(2.375)	(2.237)	(2.072)	(2.010)	(2.208)
Low_RegCap_RGL	0.022	0.008	0.018	0.009	0.015	0.019
	(1.178)	(0.595)	(0.923)	(0.769)	(1.268)	(1.204)
$Audited$	-0.016	-0.005	-0.007	-0.000	-0.002	-0.014
	(-1.524)	(-0.756)	(-0.718)	(-0.002)	(-0.292)	(-1.016)
Def_RegCap_RGL	3.522	2.509	0.359	0.642	-0.048	-0.205
	(0.673)	(1.547)	(0.054)	(0.817)	(-0.059)	(-0.107)
$Def\_RegCap\_RGL \times Aud$	-11.987	-1.589	-3.638	0.698	0.698	-2.268
	(-1.758)	(-0.744)	(-0.425)	(0.674)	(0.628)	(-0.850)
$Def\_RegCap\_RGL^2$			-421.269	7.314	-16.174	-18.168
			(-0.337)	(0.208)	(-0.448)	(-0.205)
$Def\_RegCap\_RGL^2 \times Aud$			-395.970	40.684	58.775	-110.346
			(-0.243)	(0.863)	(1.178)	(-0.897)
$DRegCap\_RGL\_Low$	-17.187	-3.438	-12.476	-1.561	-2.113	-1.701
	(-1.441)	(-0.811)	(-0.797)	(-0.325)	(-0.450)	(-0.331)
$DRegCap\_RGL\_Low \times Aud$	-10.697	-13.339	-27.618	-14.698	-13.001	-13.314
	(-0.644)	(-2.114)	(-1.214)	(-2.223)	(-2.050)	(-1.846)
$DRegCap\_RGL\_Low^2$			2,794.717	-45.017	99.888	118.663
			(0.903)	(-0.114)	(0.251)	(0.261)
$DRegCap\_RGL\_Low^2 \times Aud$			3,943.943	968.650	793.682	1,287.484
			(0.862)	(1.849)	(1.532)	(2.112)
LLA	-0.002	-1.075	-1.072	-0.576	-0.291	-0.391
	(-0.002)	(-2.053)	(-2.046)	(-2.263)	(-0.680)	(-0.635)
Non-interest Expenses	2.224	2.542	2.550	2.008	1.325	3.660
	(1.513)	(2.507)	(2.518)	(4.004)	(2.117)	(3.255)
Net Income	-1.803	-1.750	-1.756	-1.316	-0.415	0.289
	(-1.325)	(-2.039)	(-2.043)	(-3.329)	(-0.932)	(0.290)
Cash	-0.104	-0.121	-0.121	-0.068	-0.049	-0.073
	(-1.049)	(-1.871)	(-1.874)	(-2.241)	(-1.271)	(-0.949)
Non-interest Income	-1.623	-1.591	-1.628	-1.333	-0.616	-2.948
	(-0.779)	(-1.164)	(-1.193)	(-1.946)	(-0.677)	(-2.057)
Sd_ROA	1.254	0.774	0.808	0.641	0.512	-0.994
	(0.886)	(0.778)	(0.810)	(1.552)	(0.939)	(-0.874)
Loan	-0.049	-0.057	-0.056	-0.040	-0.068	-0.037
	(-1.561)	(-2.897)	(-2.858)	(-4.175)	(-4.229)	(-1.362)
Size	0.007	0.006	0.005	0.004	0.009	0.010
	(1.776)	(2.206)	(2.195)	(3.137)	(1.877)	(3.068)
ALLP	2.375	3.128	3.133	2.572	2.817	3.469
	(1.321)	(2.641)	(2.648)	(5.021)	(4.912)	(3.108)
AFS	0.274	0.239	0.240	0.211	0.237	0.246
	(6.744)	(8.726)	(8.744)	(17.195)	(10.913)	(7.222)
Observations	7,119	15,466	15,466	69,103	68,577	10,593
Adj R-squared	0.099	0.072	0.072	0.072	0.128	0.066
Polynomial Order	1	1	2	2	2	2
Sample	±0.25	±0.5	±0.5	±2	±2	±2
Bank FE	No	No	No	No	Yes	No
State-Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Federal Sup FE	Yes	Yes	Yes	Yes	Yes	Yes
Match Sample	No	No	No	No	No	Yes

Table 2.4: **Regulatory capital management using ALLP in the presence of the auditor.** The table reports the propensity to have regulatory capital before ALLP below the 10% threshold and audited financial statements and the probability of having Accretive_ALLP in a bank-quarter. Each column presents the results for different bandwidths around the 10% threshold and alternative polynomial orders for the deficit of regulatory capital before ALLP. All variables are defined in Appendix B. Standard errors are clustered at the bank level. Robust t-values are reported below the coefficient estimates.

	Accretive_ALLP					
	(1)	(2)	(3)	(4)	(5)	(6)
$Low\_RegCap\_ALLP \times Audited$	0.078	0.065	0.067	0.071	0.044	0.070
	(2.177)	(2.571)	(1.906)	(2.807)	(1.781)	(2.132)
Low_RegCap_ALLP	0.031	0.020	0.050	0.022	0.030	0.042
	(1.167)	(1.072)	(1.919)	(1.181)	(1.595)	(1.664)
$Audited$	0.007	0.007	0.009	0.003	-0.012	-0.002
	(0.386)	(0.526)	(0.514)	(0.300)	(-1.147)	(-0.107)
Def_RegCap_ALLP	2.869	0.098	-10.042	-0.064	1.882	-3.224
	(0.343)	(0.034)	(-0.955)	(-0.046)	(1.399)	(-1.257)
$Def\_RegCap\_ALLP \times Aud$	2.022	2.466	5.333	0.178	-0.353	1.739
	(0.184)	(0.676)	(0.371)	(0.101)	(-0.208)	(0.548)
$Def\_RegCap\_ALLP^2$			-1,970.756	35.250	62.559	-74.636
			(-1.015)	(0.542)	(0.997)	(-0.672)
$Def\_RegCap\_ALLP^2 \times Aud$			569.031	5.169	-17.568	92.745
			(0.215)	(0.063)	(-0.223)	(0.666)
$DRegCap\_ALLP\_Low$	-19.524	-6.349	-25.947	-1.212	-10.669	-5.210
	(-0.969)	(-0.992)	(-1.039)	(-0.139)	(-1.210)	(-0.539)
$DRegCap\_ALLP\_Low \times Aud$	-29.381	-23.543	-34.126	-31.827	-22.683	-28.935
	(-1.121)	(-2.664)	(-1.028)	(-2.655)	(-1.925)	(-2.264)
$DRegCap\_ALLP\_Low^2$			8,307.846	-557.246	317.592	483.804
			(1.664)	(-0.646)	(0.368)	(0.485)
$DRegCap\_ALLP\_Low^2 \times Aud$			1,232.309	2,802.629	1,987.447	2,166.710
			(0.186)	(2.380)	(1.724)	(1.642)
LLA	30.038	28.603	28.626	28.308	28.967	22.758
	(14.651)	(19.174)	(19.214)	(28.440)	(26.298)	(17.505)
Non-interest Expenses	5.371	1.810	1.852	1.240	3.901	1.484
	(2.050)	(0.958)	(0.981)	(0.979)	(3.312)	(0.788)
Net Income	1.490	3.277	3.317	6.577	5.492	5.537
	(0.732)	(2.246)	(2.266)	(6.939)	(6.417)	(3.975)
Cash	-0.148	-0.096	-0.096	-0.115	-0.060	-0.012
	(-1.097)	(-1.013)	(-1.018)	(-1.958)	(-0.950)	(-0.126)
Non-interest Income	-12.833	-6.615	-6.725	-6.102	-6.126	-2.513
	(-3.870)	(-2.710)	(-2.755)	(-3.480)	(-3.927)	(-0.964)
Sd_ROA	-4.180	0.687	0.694	-1.819	-5.352	-3.521
	(-0.845)	(0.753)	(0.760)	(-1.101)	(-4.478)	(-3.232)
Loan	-0.357	-0.347	-0.348	-0.394	-0.505	-0.330
	(-7.842)	(-10.065)	(-10.071)	(-17.579)	(-18.254)	(-8.931)
Size	0.009	0.003	0.003	0.001	-0.033	0.000
	(1.479)	(0.562)	(0.566)	(0.408)	(-3.893)	(0.087)
RGL	-9.675	-2.578	-2.637	-0.626	1.657	-4.513
	(-0.566)	(-0.222)	(-0.227)	(-0.125)	(0.344)	(-0.360)
Observations	6,949	15,168	15,168	68,560	68,020	10,439
Adj R-squared	0.164	0.149	0.149	0.140	0.266	0.154
Polynomial Order	1	1	2	2	2	2
Sample	±0.25	±0.5	±0.5	±2	±2	±2
Bank FE	No	No	No	No	Yes	No
State-Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Federal Sup FE	Yes	Yes	Yes	Yes	Yes	Yes
Match Sample	No	No	No	No	No	Yes

Table 2.5: **Probability of receiving an enforcement action.** The table presents a linear regression of the probability of enforcement action as a function of Accretive RGL and ALLP, and Audited. Column (1) includes all banks, Column (2) includes state-chartered banks, and Column (3) includes nationally chartered banks. Column (4) includes the match audited and unaudited banks on observable. All variables are defined in Appendix B. Standard errors are cluster at the bank level. Robust t-values are reported below the coefficient estimates.

	Enforcements_Q4			
	(1)	(2)	(3)	(4)
Accretive_RGL	0.005	0.002	0.009	0.005
	(2.249)	(1.020)	(1.855)	(1.717)
Accretive_ALLP	-0.008	-0.006	-0.013	-0.007
	(-7.127)	(-4.908)	(-5.590)	(-4.970)
Audited	-0.002	-0.001	-0.003	-0.002
	(-1.848)	(-0.795)	(-1.180)	(-1.887)
RegCap	-0.104	-0.099	-0.139	-0.100
	(-11.836)	(-11.198)	(-7.487)	(-9.139)
LLA	4.252	3.688	5.489	3.925
	(17.362)	(15.461)	(10.961)	(13.521)
Non-interest Expenses	-2.171	-1.789	-3.285	-1.812
	(-7.093)	(-5.410)	(-4.441)	(-4.272)
Net Income	-5.757	-4.267	-9.179	-5.159
	(-15.864)	(-14.374)	(-12.796)	(-13.099)
Cash	-0.027	-0.030	-0.019	-0.031
	(-2.489)	(-2.501)	(-0.824)	(-2.101)
Non-interest Income	3.741	3.015	4.970	3.132
	(7.088)	(5.791)	(4.552)	(4.812)
Sd_ROA	3.893	6.219	1.955	4.688
	(3.861)	(10.958)	(2.051)	(5.403)
Loan	-0.049	-0.049	-0.051	-0.047
	(-9.863)	(-9.047)	(-4.845)	(-6.629)
Size	0.005	0.007	-0.000	0.005
	(7.353)	(9.150)	(-0.298)	(5.928)
Observations	344,942	261,792	82,943	151,485
Adj R-squared	0.060	0.058	0.087	0.053
Bank Sample	All	State	National	Match
Bank FE	No	No	No	No
State-Time FE	Yes	Yes	Yes	Yes
Federal Sup FE	Yes	Yes	No	Yes

Table 2.6: **Regulatory capital management for state vs. nationally chartered banks.** The table report the propensity to have regulatory capital before RGL (ALLP) below the 10% threshold and the probability of having Accretive_RGL (ALLP) in a bank-quarter for state vs. nationally chartered banks. Each column presents the results for a ± 2 bandwidth around the 10% threshold and polynomial of second-order for the deficit of regulatory capital before RGL (ALLP). All variables are defined in Appendix B. Standard errors are clustered at bank level. Robust t-values are reported below the coefficient estimates.

		State Banks		National Banks	
		Accretive_RGL	Accretive_ALLP	Accretive_RGL	Accretive_ALLP
		(1)	(2)	(3)	(4)
Audited	*Low_RegCap_X*	0.055	0.061	0.022	0.124
		(3.777)	(3.139)	(0.960)	(3.582)
	Observations	34,017	33,692	10,048	9,917
	Adjusted R-squared	0.147	0.270	0.097	0.313
Unaudited	*Low_RegCap_X*	0.019	0.037	0.038	-0.034
		(1.480)	(1.739)	(1.019)	(-0.719)
	Observations	19,606	19,508	3,635	3,624
	Adjusted R-squared	0.114	0.270	0.110	0.296
	Polynomial Order	2	2	2	2
	Sample	$\pm$ 2	$\pm$2	$\pm$2	$\pm$2
	Controls	Yes	Yes	Yes	Yes
	Bank FE	Yes	Yes	Yes	Yes
	State-Time FE	Yes	Yes	Yes	Yes
	Federal Sup FE	Yes	Yes	No	No

Table 2.7: **Regulatory capital management for lenient vs. strict state supervisors.** The table report the propensity to have regulatory capital before RGL (ALLP) below the 10% threshold and the probability of having Accretive_RGL (ALLP) in a bank-quarter for lenient vs. strict state supervisors. Each column presents the results for a ±2 bandwidth around the 10% threshold and polynomial of second-order for the deficit of regulatory capital before RGL (ALLP). All variables are defined in Appendix B. Standard errors are clustered at bank level. Robust t-values are reported below the coefficient estimates.

		Lenient supervisor		Strict supervisor	
Variables		Accretive_RGL	Accretive_ALLP	Accretive_RGL	Accretive_ALLP
		(1)	(2)	(3)	(4)
Audited	*Low_RegCap_X*	0.059	0.067	0.044	0.062
		(3.216)	(2.672)	(1.780)	(2.012)
	Observations	20,225	20,008	13,766	13,659
	Adj R-squared	0.150	0.260	0.148	0.290
Unaudited	*Low_RegCap_X*	0.023	0.047	0.014	0.032
		(1.252)	(1.548)	(0.785)	(1.076)
	Observations	10,491	10,438	9,093	9,048
	Adj R-squared	0.110	0.273	0.118	0.268
	Polynomial Order	1	1	1	1
	Sample	±2	±2	±2	±2
	Controls	Yes	Yes	Yes	Yes
	Bank FE	Yes	Yes	Yes	Yes
	State-Time FE	Yes	Yes	Yes	Yes
	Federal Sup FE	Yes	Yes	Yes	Yes

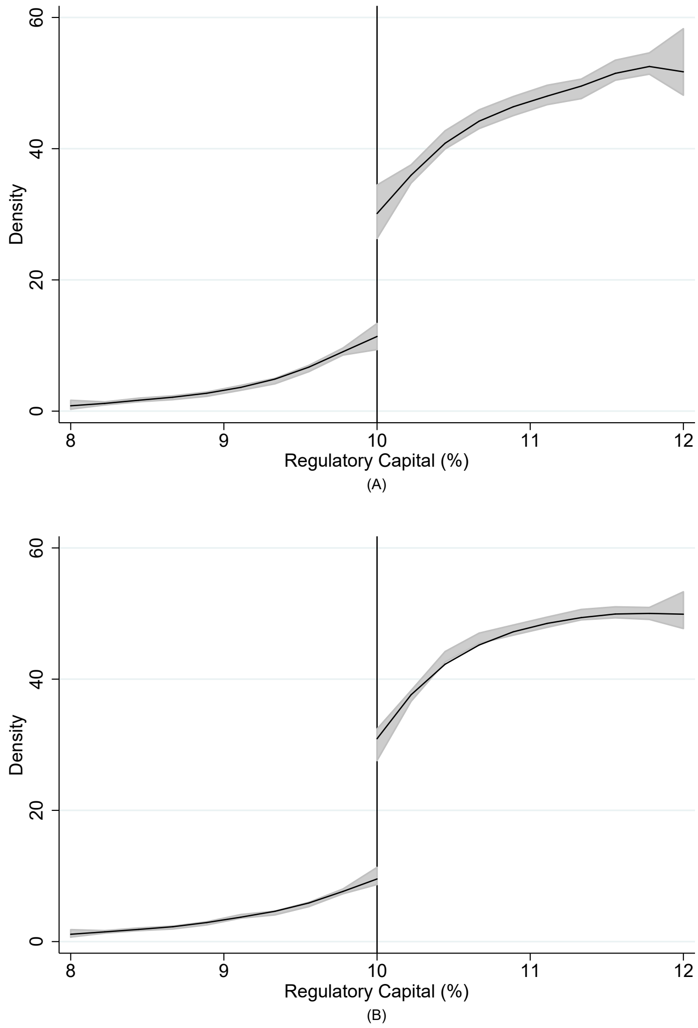


Figure 2.1: **Discontinuity around the 10% threshold of regulatory capital - Unaudited vs. audited banks.** Panel A plots the density function of reported regulatory capital for unaudited banks, and Panel B plots the density function of reported regulatory capital for audited banks. Solid lines show the point estimates and gray areas present 95% confidence intervals in al interval of 8% to 12%. T-statistics are 8.15 and 14.16, respectively. They are calculated using local polynomial density estimation (polynomial of order 2) (Calonico et al., 2014, 2017).

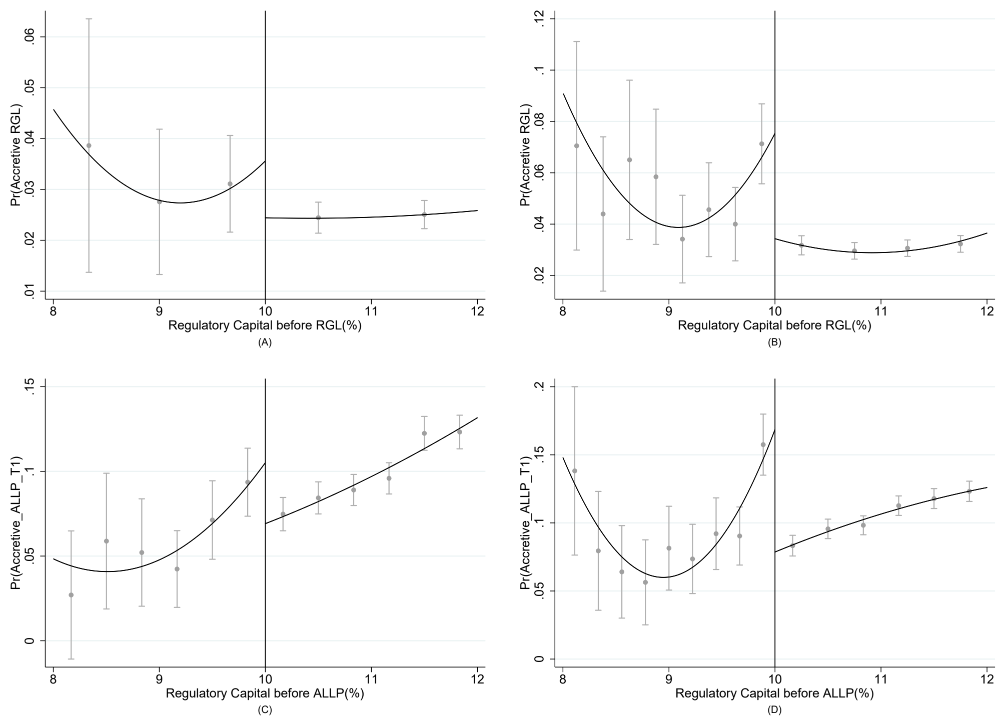


Figure 2.2: **Discontinuity around the 10% threshold of adjusted regulatory capital - Audited vs. unaudited banks.** These plots exhibit the probability of having Accretive RGL for unaudited (Panel A) and audited banks (Panel B), and the probability of having Accretive ALLP for unaudited (Panel C) and audited banks (Panel D) as a function of the regulatory capital before RGL and ALLP. Dots represent the sample average within the bin, and the vertical grey lines show the confidence intervals. The black lines show the polynomial fit (order 2).T-statistics are -1.05, -4.22, -2.01, and -5.06 respectively. They are calculated using local polynomial density estimation (polynomial of order 2) (Calonico et al., 2014, 2017).

Chapter 3

Common Ownership and Financial Reporting Quality

Co-authored with Facundo Mercado and Silvina Rubio.

3.1 Introduction

In this study, we examine the association between common ownership and financial reporting quality. In particular, we analyze whether industries with higher institutional investors overlap have more comparable financial statements, better accruals quality, and whether they are able to reduce accruals and real earnings manipulations.

Nowadays, many firms are natural competitors within the industry, which are held by a small set of large institutional investors, or common owners. Common ownership is an extra degree of market concentration and is attained by partial acquisitions of firms by large asset management companies that, in many cases, have control over the industry as a whole. Institutional investors are the largest shareholders of American publicly traded corporations, holding about 67% of common shares outstanding as of the end of 2010 (Blume and Keim, 2012). BlackRock, the largest asset management company in the U.S., has more than one-fifth of all American publicly traded firms

(Craig, 2013). Moreover, three of the largest institutional investors (Vanguard, State Street, and BlackRock) also have stakes in natural competitors. For instance, they are the largest institutional investors in some of the largest banks in the United States[1], in the tech industry like Apple and Microsoft, and in the pharmaceutical industry like CVS and Walgreens (Azar et al., 2016b,a). Common ownership is a pervasive phenomenon that spans across all industries with unknown effects on several dimensions of firms' actions, including financial reporting quality.

When institutional investors have concentrated ownership within an industry, they are more likely to understand the dynamics of firms' operations that may lead to two potential effects. On the one hand, common ownership might increase the monitoring ability of institutional investors, reducing agency cost and incentives to misreport (Bushee, 1998; Ramalingegowda and Yu, 2012) and also pressure firms to choose more comparable accounting methods (Jung, 2013). On the other hand, institutional investors are likely to have privileged information and rely more on direct monitoring and less on accounting measures (Shleifer and Vishny, 1986; Ke et al., 1999). Therefore, an increase in common ownership could also lead to a deterioration of the financial reporting quality. Thus, whether common ownership has a positive or negative effect on the firm's financial reporting quality is an empirical question.

To test whether common ownership is associated with financial reporting quality, we focus on two aspects of financial reporting quality that are more likely to reflect the effects of common ownership: (i) financial statements comparability, and (ii) earnings quality. If common ownership increases the demand for more comparable accounting information among firms and reduces incentives to misreport, it should be reflected in higher financial statements comparability (i.e., similar economic events produce similar financial statements in different firms) and better earnings quality (i.e. earning numbers that are less subject to managerial discretion or estimation errors).

In our main specification, we estimate a fixed-effects panel data model of financial

[1] JP Morgan Chase, Bank of America, Citigroup, Wells Fargo, and U.S. Bank.

reporting quality measures on common ownership. We operationalize financial reporting quality using five proxies: (i) the comparability measure developed by De Franco et al. (2011), (ii) accruals quality, as in Dechow and Dichev (2002), (iii) the discretionary component of accruals quality, following Francis et al. (2005), (iv) unsigned discretionary accruals using the modified Jones (1991) model, as in Dechow et al. (1995) and, (v) an aggregate measure of real earnings management following Roychowdhury (2006b) and Zang (2012b). While comparability describes the degree of similarity in the among firms within the industry, the other proxies of financial reporting quality are firm-specific and calculated independently of the attributes of other comparable firms (De Franco et al., 2011).

To construct our measure of common ownership we follow Azar et al. (2016b) and proxy common ownership using the "modified Herfindahl-Hirschman index" (MHHI), as in O'Brien and Salop (2000). To alleviate endogeneity concerns, we include in our models year- and firm-fixed effects to control for economic cycles and time-invariant firm-specific factors that might be confounding variables of common ownership in explaining financial reporting quality.

Overall our results indicate that common ownership is positively related with firms' financial reporting quality. Consistent with institutional investors that have control over the industry, they demand more comparable accounting information, understand better the long-term value implications of managerial actions, and are more effective at deterring earnings manipulations.

To the best of our knowledge, this is the first paper to analyze the influence of common ownership on financial reporting quality. This study contributes to the literature in several dimensions. We contribute to the accounting literature that relates competition and financial reporting quality (Marciukaityte and Park, 2009; Li, 2010; Datta et al., 2013; Dhaliwal et al., 2014; Balakrishnan and Cohen, 2014; Markarian and Santalo, 2014; Lin et al., 2015). Most of these papers use proxies of product market concentration, but they do not take into account common ownership. Closest to out paper is Jung (2013) who finds that investors overlap explains why firms decide to increase voluntary disclosure. However, our paper differs in two ways. First, we examine the association on financial reporting quality in a broader sense. On the other hand, we use a different measure of institutional investors overlap, constructed at the industry level (and not relative to the industry leader), and considers not only the number of overlapping institutional investors, but also, their voting and control powers (Azar et al., 2016b).

In addition, we add new insights into the consequences of common ownership. Azar et al. (2016b) and Azar et al. (2016a) find that common ownership has anticompetitive effects, leading to an increase in prices in the airline industry and the banking sector. On the contrary, Koch et al. (2020) find that common ownership does not reduce competition. To this debate, we add evidence that common ownership has a positive impact on financial reporting quality. Finally, we add to the corporate finance literature and institutional investors' perspective.Dimson et al. (2015) have recently shown that "universal owners" are actively engaged with their portfolio companies. It is in their interest to maximize the potential benefits of owning most of the industry by influencing investee firms' businesses. Chen et al. (2007) show that independent institutional investors (institutions that do not seek business relationships with the firms in which they invest) will specialize in monitoring activities. We contribute by showing another channel in which institutional investors actively influence the firms in which they have participation.

The paper proceeds as follows. The next section discusses the expected association between common ownership and financial reporting quality, along with the related literature. Section 3 contains the variable definitions and describes the sample data. Section 4 describes the empirical methodology and results, and Section 5 concludes.

3.2 Related Literature and Hypothesis Development

The importance of accounting in the economic system relies on two primary roles, the better allocation of resources and the reduction in agency costs. Akerlof (1970) explained that adverse selection could lead to market breakdown and the absence of efficient trading. In this sense, accounting information has an ex-ante role in allowing a better allocation of funds from capital providers (Beyer et al., 2010). In other words, accounting assists investors in differentiating between "good" and "bad" firms.

The second role of accounting is providing information to ease monitoring and help in reducing the agency cost. The agency theory of the firm defines different conflicts of interest that lead to agency costs and the appearance of inefficient outcomes. Jensen and Meckling (1976), established that agency problems between managers and shareholders of a firm proceed from the separation of ownership and control. Capital providers can employ accounting ex-post to monitor the use of their capital (Beyer et al., 2010).

Since information about firms is costly to acquire and process (Merton, 1987), the monitoring incentives and ability of institutional investors is determined by several factors: their investment horizon, their financial sophistication, the stake they have in the firm, and the independence of the institution (Shleifer and Vishny, 1986; Bushee, 1998; Chen et al., 2007). Accordingly, Bushee (1998) emphasizes that the sophistication and long-term orientation of institutional investors remove the incentives for myopic managerial behavior by providing a higher degree of monitoring. Survey evidence presented by Graham et al. (2005b) find that managers are willing to give up long-term value to manage short-term financial reporting outcomes. Long-term investors help to reduce this myopic behavior. If the monitoring is implicit (through information gathering), institutional investors demand high-quality accounting information to alleviate the agency cost.

Moreover, firms commonly owned are likely to receive pressures from institutional investors seeking similar decisions to report economic events among investees (Jung, 2013). The pressure is likely to be concentrated in firms within the same industry because the common set of buy-side analysts and portfolio managers employed by institutions typically follow firms along industry lines and are in continuous contact with firms managers. In this line, Jung (2013) discuss two channels in which institutional investors facilitate within industry information demand: (i) the communication channel in which they help firms to discover other firms' actions over the time (institutional investors facilitates the transfer of information across firms) and, (ii) the feedback mechanism in which they inform firms' managers about the desirability of additions or changes in financial disclosure.

More comparable firms constitute better benchmarks (De Franco et al., 2011; Neel, 2017) and, therefore lower monitoring costs. Neel (2017) provides evidence of comparability, reducing information asymmetries, which leads to an increase in firm valuation. Moreover, large shareholders do not want to suffer the adverse stock price reactions if it is discovered that their portfolio firms are misreporting. It is likely that institutional investors remove managers' incentives to misbehave and reduce agency costs. Giannetti and Wang (2016) show that corporate scandals reduce household stock market participation, affecting not only fraudulent firms but also non-fraudulent ones. This could result in large losses even for diversified institutional investors. That is, managerial slack may result in a negative significant stock market reaction (Hribar and Jenkins, 2004). In that case, large shareholders are going to exert effort in monitoring against accounting misreporting. Accordingly, we state our first hypothesis as follows:

H1a: Common ownership is positively associated with financial reporting quality, ceteris paribus.

On the other hand, institutional investors have internal information about the firms and industry; therefore, they may no longer need to rely on monitoring through accounting numbers. Shleifer and Vishny (1986) show that large non-management shareholders of publicly-held firms benefit from direct monitoring management. Ke et al. (1999) suggest that institutional investors are more likely to have privileged access to inside information; they may rely more on direct monitoring and less on indirect monitoring. McCahery et al. (2016) document that long-term institutional investors engage in "behind-the-scenes" interventions; they have direct discussions with management and have private conversations with the company's board outside management's presence. Therefore, this expectation can be expressed in the following alternative hypothesis:

H1b: Common ownership is negatively associated with financial reporting quality, ceteris paribus.

3.3 Variable Definitions and Data Description

In the following subsections, we conceptually define common ownership, explain how we compute the measures of financial reporting quality, we present the set of control variables, and finally, we describe our sample data.

3.3.1 Main variable of interest: proxy for common ownership

Following Azar et al. (2016b), our measure of common ownership is derived from the "modified Herfindahl-Hirschman index" (MHHI), a proxy that builds on O'Brien and Salop (2000). The total market concentration, MHHI, is the sum of two parts: i) the product market concentration Herfindahl-Hirschman Index (HHI) that captures the number and relative size of competitors and, ii) the common ownership concentration (d_MHHI) that captures to which extent these competitors are owned by the same institutional investors. Formally, it can be express as follows:

$$MHHI = HHI + d\_MHHI$$

$$\sum_j \sum_k s_j s_k \frac{\sum_i \gamma_{ij}\beta_{ik}}{\sum_i \gamma_{ij}\beta_{ij}} = \sum_j s_j^2 + \sum_j \sum_{k \neq j} s_j s_k \frac{\sum_i \gamma_{ij}\beta_{ik}}{\sum_i \gamma_{ij}\beta_{ij}}, \tag{3.1}$$

where s_j is the market share of firm j, β_{ij} is the fraction of firm j that is owned by owner

i, γ_{ij} is the control share (voting rights) of firm j exercised by owner i, and k indexes the competitors of the firm j. In a setting with separately owned firms, d_MHHI is zero, and total market concentration coincides with the HHI. However, when there is investors overlap, common ownership plays an important role in total market concentration. In this paper, we define industries at the 2-digit SIC code.

For instance, consider an industry in which there are only two firms, A and B, and each firm has half of the market. If firms are separately owned, the HHI is equal to 0.5 on a scale from 0 (perfect competition) to 1 (monopoly), and the MHHI is also 0.5. Now, consider the case in which there are three investors and one of them has stakes in both firms and that ownership share (β) is the same as voting rights (γ). Institutional investor 1 has a $\beta_{1,A} = 0.4$ and $\beta_{1,B} = 0.7$. Institutional investor 2 has a 60% of firm A, and institutional investor 3 has 30% of firm B. In this second example, the HHI is still 0.5, but the MHHI is 0.76. In this case, common ownership, d_MHHI, is 0.26.

3.3.2 Dependent variables: proxies for financial reporting quality

According to the International Accounting Standards Board (IASB), financial information is useful when it is relevant, and faithfully represents firms' economic performance. The usefulness of financial information is enhanced if it is comparable, verifiable, timely and understandable (IASB 2001). The maximization of those desirable qualities is among the objectives of the IASB.

Conceptually financial reporting quality is an unobservable construct that is associated with the attributes that make information useful for decision making. We hypothesize that higher common ownership increases institutional investors' demand for more comparable information. Financial statement comparability reduces the cost of information gathering and enhances the quantity and quality for users of financial information (De Franco et al., 2011), which ultimately facilitates monitoring and reduces agency costs. We focus on two aspects of financial reporting quality that we consider are the most appropriate for testing our hypothesis: (i) financial statements comparability, and (ii) earnings quality.

Financial statements comparability implies that for a given set of economic events, different firms produce similar financial statements, allowing the users of accounting information to evaluate better alternative opportunities (e.g. investing opportunities). We operationalize comparability following De Franco et al. (2011) measure, and it is constructed as follows:

$$CompAcct_{ijt} = -\frac{1}{16}\sum_{t-15}^{t} |E(Earnings_{iit}) - E(Earnings_{ijt})|, \tag{3.2}$$

where $E(Earnings_{iit})$ is the predicted earnings of firm *i* given firm *i*'s function and firm *i*'s return in period *t*; and, $E(Earnings_{ijt})$ is the predicted earnings of firm *j* given firm *j*'s function and firm *i*'s return in period *t*. The idea behind this proxy is that for a given set of economic events, two firms are comparable if they produce similar financial statements. In particular, we use the median $CompAcct_{ijt}$ for all firms *j* in the same industry as firm *i* during period *t*. Greater values of $CompAcctInd_{it}$ indicate greater comparability. As indicated by De Franco et al. (2011), $CompAcctInd_{it}$ is positively related to analyst following and forecast accuracy, and negatively related to analysts' dispersion in the earnings forecasts. The latter validates the measure and suggest that comparability lowers the cost of information, and increases the overall quantity and quality of information available to analysts about the firm.

As a second aspect of financial reporting quality, we attempt to capture earnings quality. Earnings are of higher quality when they better reflect features of firm's economic performance that are relevant for decision making but might be affected by opportunistic managerial discretion or estimation errors (Dechow et al., 2010). Following previous literature, we use alternative proxies that captures different aspects of earnings quality.

Dechow and Dichev (2002) build a proxy for accruals quality that capture the extent to which working capital accruals map into operating cash-flows. The estimated model is:

$$\frac{ACC_{i,t}}{A_{i,t-1}} = \phi_0 + \phi_1 \frac{CFO_{i,t-1}}{A_{i,t}} + \phi_2 \frac{CFO_{i,t}}{A_{i,t}} + \phi_3 \frac{CFO_{i,t+1}}{A_{i,t}} + \epsilon_{i,t}, \tag{3.3}$$

where total accruals ($ACC_{i,t}$) is calculated using the cash-flow approach (Hribar and Collins, 2002) as earnings before extraordinary items and discontinued operations (Compustat item ibc) minus the operating cash flows (Compustat item oancf) in year t, $CFO_{i,t}$ is cash from operating activities in year t (Compustat item oancf), and A_t is total assets (Compustat item at) in year t. We estimate Eq. 3.3 for each year-industry (we define industry using 2-digit SIC code) with at least 20 observations, to obtain a firm- and year-specific estimation of the residuals ($\epsilon_{i,t}$). The error term in Eq. 3.3 captures the unexplained portion of the variation in accruals and can be interpreted as an inverse measure of accruals quality. Our accruals quality measure ($AQ\_DD_{i,t} = \sigma(\epsilon_{i,t})$) is the standard deviation of the residuals in Eq. 3.3 over the last five years. The higher AQ_DD, the higher the uncertainty in accruals, indicating poor financial reporting quality.

Alternatively, we use the discretionary component of AQ_DD. Dechow and Dichev (2002) identify five economic (or innate) factors related to accruals quality: firm size, the volatility of operating cash-flows, volatility of sales revenue, length of the operating cycle, and the incidence of negative earnings. Following Francis et al. (2005) we estimate the following equation:

$$\begin{aligned} AQ\_DD_{i,t} =& \lambda_0 + \lambda_1 Size_{i,t} + \lambda_2 \sigma(CFO_{i,t}) + \lambda_3 \sigma(Sales_{i,t}) + \lambda_4 OpCycle_{i,t} \\ &+ \lambda_5 Neg\_Earn_{i,t} + \mu_{i,t}, \end{aligned} \tag{3.4}$$

where $Size_{i,t}$ is the natural logarithm of total assets in year t, $\sigma(CFO_{i,t})$ is the standard deviation of operating cash-flows over the last 10 years, $\sigma(Sales_{i,t})$ is the standard deviation of sales revenues over the last 10 years, $OpCycle_{i,t}$ is the length of operating cycle calculated as the sum of days inventory and days accounts receivable, and $Neg\_Earn_{i,t}$ is the number of years with negative net income before extraordinary items over the last 10 years. The estimated residual from Eq. 3.4 yields an estimate of the discretionary component of accruals quality ($Disc\_AQ\_DD$). Larger values of the residuals are indicative of lower financial reporting quality.

Our next proxy for reporting quality is the absolute value of discretionary accruals measured using the modified Jones (1991) model, as by Dechow et al. (1995). Discretionary accruals are the difference between firms' total accruals and those accruals explained by changes in revenues and property plant and equipment (i.e., the normal level of accruals). The estimated equation is:

$$\frac{ACC_{i,t}}{A_{i,t-1}} = \alpha_0 + \alpha_1(\frac{1}{A_{i,t-1}}) + \alpha_2(\frac{\Delta S_{i,t}}{A_{i,t-1}}) + \alpha_3(\frac{PPE_{i,t}}{A_{i,t-1}}) + \epsilon_{i,t}, \tag{3.5}$$

where ΔS_t is the change in sales (Compustat item sale) from year $t-1$ to t and PPE_t is gross property plant and equipment (Compustat item ppegt) in year t. Eq. 3.5 is estimated cross-sectionally by year-industry (we define industry using 2-digit SIC code) with at least 15 observations using the entire sample of Compustat.

Then, normal accruals (N_ACC) are calculated as:

$$\frac{N\_ACC_{i,t}}{A_{i,t-1}} = \hat{\alpha}_0 + \hat{\alpha}_1(\frac{1}{A_{i,t-1}}) + \hat{\alpha}_2(\frac{\Delta S_{i,t} - \Delta AR_{i,t}}{A_{i,t-1}}) + \hat{\alpha}_3(\frac{PPE_{i,t}}{A_{i,t-1}}), \tag{3.6}$$

where the change in accounts receivables ($\Delta AR_{i,t}$) from year $t-1$ to t (Compustat item rect) is subtracted from the change in sales as proposed by Dechow et al. (1995). Discretionary accruals ($Disc\_ACC$) for year t are defined as total accruals minus the normal level of accruals derived from a modified Jones (1991) model:

$$Disc\_ACC_{i,t} = \frac{ACC_{i,t}}{A_{i,t-1}} - \frac{N\_ACC_{i,t}}{A_{i,t-1}}, \tag{3.7}$$

in which the underlying assumption in this model is that the discretionary component of total accruals proxies for accrual-based earnings management, therefore the higher the absolute value of discretionary accruals ($|Disc\_ACC|$) the worst the financial reporting quality.

Finally, our last proxy for financial reporting quality is an aggregate measure of real earnings management. Following Roychowdhury (2006b) and Zang (2012b) we use discretionary expenditures and production costs to detect overproduction, sales manipulation, and reductions of discretionary expenditures. To construct our measure of real earnings management, we first estimate the following equations within each year and two-digit SIC industry:

$$\frac{PC_{i,t}}{A_{i,t-1}} = \alpha_0 + \alpha_1(\frac{1}{A_{i,t-1}}) + +\alpha_2(\frac{\Delta S_{i,t}}{A_{i,t-1}}) + \alpha_3(\frac{\Delta S_{i,t-1}}{A_{i,t-1}}) + \epsilon_{i,t}, \quad (3.8)$$

$$\frac{DE_{i,t}}{A_{i,t-1}} = \alpha_0 + \alpha_1(\frac{1}{A_{i,t-1}}) + \alpha_2(\frac{\Delta S_{i,t}}{A_{i,t-1}}) + \epsilon_{i,t}, \quad (3.9)$$

where production costs ($PC_{i,t}$) are defined as the change in inventory (Compustat item invt) from year $t-1$ to t plus the cost of goods (Compustat item cogs) sold in year t, A_{t-1} is the amount of total assets in quarter $t-1$, S_t are sales in quarter t. Discretionary expenditures ($DE_{i,t}$) are defined as the sum of advertising (Compustat item xad), R&D (Compustat item xrd) and SG&A expenditures (Compustat item xsga) in year t. We require at least 15 observations to perform each estimation. Abnormal levels of production costs $(AB\_PC_{i,t})$ and abnormal discretionary expenditures $(AB\_DE_{i,t})$ are measured as the residuals of Eq. 3.8 and Eq. 3.9, respectively. Higher values of $AB\_PC_{i,t}$ indicate more real earnings management while higher values of $AB\_DE_{i,t}$ indicate the opposite. Therefore, we define our proxy for real earnings management as $REM_{i,t} = AB\_PC_{i,t} - AB\_DE_{i,t}$. REM is constructed this way in order to be positively related with income-increasing real earnings management. Then, the higher $REM_{i,t}$ the poorer the financial reporting quality.

3.3.3 Controls

We control for product market competition including, the HHI. The evidence of the effect of product market competition on financial reporting quality is mixed. On the one hand, the literature demonstrates that competition works as a mechanism to discipline managers (alleviating the agency cost) given that there is a "liquidation threat" (Hart, 1983; Schmidt, 1997). Moreover, competition provides a benchmark to compare managers' performance with respect to other peers and, in general, reduce managerial slack. Balakrishnan and Cohen (2014) find that it has a disciplinary effect on managers, reducing misreporting of accounting information. On the other hand, Shleifer (2004) explains that there are situations in which competitive pressures to meet market expectations lead to unethical behavior like earnings manipulation.

Following previous literature we control for other determinants of financial reporting quality: firm size, growth opportunities, firm performance, and leverage (Dechow and Dichev, 2002; Lafond and Roychowdhury, 2008; Dechow et al., 2010; Ramalingegowda and Yu, 2012; Balakrishnan and Cohen, 2014). We measure firm size, a proxy for information asymmetry, using the market value of equity (Compustat, prcc_f*csho). In leveraged firms, debt holders act as monitors, reducing agency problems. Therefore, it is expected that financial reporting quality varies with the firm's capital structure. We define leverage as the ratio of total debt over total assets (Compustat, (dltt+dlc)/at). Equity raised is defined as the ratio of sales of common and preferred stock over total assets (Compustat, sstk/at). We control for performance proxied by return on assets (Compustat, ni/at). We also control for growth opportunities (Compustat, ceq/(prcc_f * csho)). Additionally, we include the lag of the dependent variable to control for the persistence or mean reversion of the FRQ measures. Finally, because real and accruals management may substitutes each other (Zang, 2012b), we include them as controls.

Institutional investors are large and sophisticated market players (see, for instance, Chan and Lakonishok, 1995; Ramalingegowda and Yu, 2012), which can effectively monitor firms. A potential concern could be that the proxy indirectly captures the effect of institutional ownership on financial reporting quality. To isolate the impact of common ownership, we control for the proportion of shares owned by institutional ownership, as well as the concentration of these investors at the firm level, measured as the fraction of shares outstanding held by institutional investors and the Herfindahl-Hirschman index (Thomson-Reuters Institutional Holdings (13F) Database, instown and instown_hhi), respectively.

3.3.4 Sample and data

Our final sample is composed of 3,942 US publicly-listed firms over the period 2001-2014. We use Compustat to obtain financial data and construct the Herfindahl-Hirschman Index. We obtain institutional ownership data from Thomson Reuters database to calculate common ownership and institutional ownership. We drop firm-year observations with missing or negative value of assets or sales. Financial institutions (SIC 6000-6999) are excluded because their accounting differs. To mitigate the influence of outliers, the continuous variables are winsorized at the 1st and 99th percentiles. Table 3.1 presents the descriptive statistics of the financial reporting quality, the main variable of interest, and control variables. Additionally, in Table 3.2, we present the correlation matrix.

Table 3.1 shows the summary statistics for the main variables used in this study. Sample firms are large (average market value of equity is 5.92), profitable taking in account that our sample includes the last financial crisis (return on assets is almost zero) consistent with previous literature (see for instance, Francis et al., 2005; Ramalingegowda and Yu, 2012; Zang, 2012b; Balakrishnan and Cohen, 2014). With respect to our financial reporting quality variables, the mean of accounting comparability is -2.71, accruals quality has a mean of 0.10, discretionary accrual quality presents a negative mean (-0.05), the mean of unsigned discretionary accruals is 0.331, and the mean of real earnings management is 0.02, similar to the magnitudes obtained by Zang (2012b). d_MHHI presents a mean of 0.20 and a standard deviation of 0.14, similar to the magnitudes obtained in Azar et al. (2016b). The common ownership measure represents, on average, about 72.16% of the total MHHI.

Table A.1 shows the correlation matrix. d_MHHI is positively and significantly correlated with accounting comparability, consistent with our prediction. However, the unconditional correlation coefficient is positively for accruals quality and discretionary accruals quality. Even though common ownership is not contemporaneously correlated with REM, the association is negative and statistically significant when we measure REM in $t+1$ (untabulated). The correlation between d_MHHI and HHI is negative and significant, suggesting that industries that are less concentrated at the product-market level are more concentrated in terms of common ownership.

3.4 Empirical Methodology and Results

3.4.1 Empirical Methodology

In this section, we investigate whether firms' financial reporting quality is associated with common ownership. To test our hypothesis we estimate the following model:

$$FRQ_{i,s,t} = \alpha d\_MHHI_{s,t} + \beta HHI_{s,t} + \gamma X_{i,s,t-1} + \theta_i + \delta_t + \epsilon_{i,s,t}, \tag{3.10}$$

where $FRQ_{i,s,t}$ is one of the financial reporting quality proxies explained above, $d\_MHHI_{s,t}$ and $HHI_{s,t}$ are measures of the common ownership and product market competition at the industry level, respectively. $X_{i,s,t-1}$ is a matrix of controls derived from previous literature, θ_i are firms fixed-effects, and δ_t is the year fixed effects.

3.4.2 Results

Accounting Comparability

In our first analysis, we study the association between accounting comparability and common ownership. Table 3.3 reports the results of estimating Eq. 3.10 using $CompAccInd$ as the dependent variable. Column (1) reports the results controlling for firm characteristics, the unsigned discretionary accruals ($Disc\_ACC$), and real earnings management (REM) (to be sure that results are not driven by other FRQ measures). In addition, we control for the lag of the dependent variable because we expect comparability to be persistent.[2] In Column (2) we repeat the regression, including controls for the fraction of shares owned by institutional investors (IO) and their concentration within a firm (IO_HHI) to rule out the possibility that our main variable of interest (d_MHHI) captures the effect of institutional ownership.

We find a positive and significant association between $CompAccInd$ and d_MHHI in both specifications. After introducing the set of controls IO and IO_HHI in Column (2), the coefficient for d_MHHI is 1.071 statistically significant at conventional levels. Regarding the economic significance, we find that one-standard deviation increase in common ownership is associated with a 5.53% (=1.071x0.14/2.712) increase in $CompAccInd$, relative to the mean. To get a better perspective of the economic significance, we compare the magnitudes with respect to the association of other variables. Specifically, one-standard deviation increase in institutional ownership holdings results in 5.57% (=0.487x0.31/2.712) increase in accounting comparability. Accordingly, these results suggest that the magnitudes of the correlation between institutional ownership holdings (IO) and the financial reporting quality measures are similar to that of common ownership (d_MHHI).

Additionally, we find a positive and significant association between accounting comparability and firms' performance, size and the lag of accounting comparability. There is also a negative and significant association between accounting comparability growth opportunities and leverage.

To sum up, when institutional investors overlap within an industry, firms' financial statements tend to be similar, increasing comparability, consistent with Jung (2013). We do not rule out the possibility that an increase in comparability within an industry might induce institutional investors to increase their holding in that industry because of the reduction in information gathering and monitoring costs (De Franco et al., 2011). However, in untabulated results, we include leads and lags of d_MHHI and HHI and find that only the contemporaneous and the lead values of common ownership are pos-

[2] If firms are comparable to the industry in current year it is very likely that in previous year they where comparable.

itive and significant, suggesting that probably the direction goes from higher common ownership to greater comparability as in Jung (2013). In untabulated regressions, we use as dependent variable the mean $CompAcct_{ijt}$ for all firms *j* in the same industry as firm *i* and alternative measures of accruals; results are qualitative the same.

Earnings Management

Table 3.4 reports the results of estimating Eq. 3.10 for different proxies of earnings management. Columns (1) to (4) reports the estimations using AQ_DD, Dis_AQ_DD, $Disc\_ACC$, and REM as dependent variables, respectively, controlling for firm characteristics, institutional ownership, the lag of the dependent variable and REM for the accruals base measures and $Disc\_ACC$ for REM measure.

Columns (1) and (2) show the association between common ownership and volatility of accruals, and the discretionary component of accruals, respectively. The results are not statistically significant at conventional levels after controlling for known determinants of financial reporting quality. In column (3) we find a negative and significant association between d_MHHI and $Disc\_ACC$. The economic effect is also relevant: one-standard deviation increase in common ownership is associated with a 43.99% (=1.04x0.14/0.331) decrease in discretionary accruals. In column (4) we find that common ownership is also associated with a statistically and economically significant decline in real earnings manipulation. One-standard deviation increase in common ownership is associated to a 63.54% (=0.118x0.14/0.026) decrease in REM.

Regarding firms' characteristics, we find that growth opportunities are significant and positively associated with real earnings management, but it is insignificant for accruals-based proxies. Firms' performance, measured by ROA, is negatively associated with accruals quality and discretionary accruals quality. We also find that leverage loads is significant and negatively associated with discretionary accruals quality, consistent with the monitoring role of debt-holders. However, leverage is positively associated with real earnings management. Other unobservable and time-invariant firms' characteristics are captured by firm fixed effects.

The lag of the dependent variable is consistently significant in all the regressions, suggesting that accruals and real activities manipulation is related among periods. In column (3), we find that the lag of discretionary accruals is negative and significant, supporting the idea of reversal to the mean. However, Column (1), (2), and (4) report a positive and significant association between financial reporting quality proxies and its lag, consistent with persistence idea. Real earnings management is negatively associated with accruals manipulation, and vice versa, supporting the substitution effect between each other suggested by Zang (2012b).

Robustness Check

In this subsection, we repeat the above analysis, but we estimate the effect of common ownership in t on financial reporting quality in $t+1$. This is because the effect of common ownership on financial reporting quality might show up with some lag, as it might take time to adopt and change the way financial information is reported. Moreover, this specification is less likely to be purely driven by reverse causality, i.e., the fact that more comparable financial statements attract more institutional investors within an industry, increasing common ownership.[3]

In table 3.5 we show that an increase in common ownership is associated with an increase in financial reporting quality in the next period. The results are economically and statistically significant at conventional levels (except for $Disc\_AQ\_DD$). In particular, common ownership is associated with higher comparability ($CompAccInd$), higher accruals quality (AQ_DD and $Disc\_ACC$) and lower real activities manipulation (REM), after controlling for several determinants of financial reporting quality.

[3] In untabulated results, we also perform the regressions considering all the variables in changes and results are qualitatively similar.

3.5 Conclusion

The purpose of this study is to analyze the relationship between common ownership and financial reporting quality. Consistent with the hypothesis that higher common ownership increases institutional investors' ability to monitor managers, we show that there is a positive association between the aforementioned variables. Our results hold using alternative proxies for financial reporting quality previously considered in the literature, and after controlling for several known determinants and unobservable time-invariant firm characteristics that might influence financial reporting quality.

Table 3.1: **Summary Statistics.** The table provides summary statistics of the main variables used in this study. All control variables are lagged and winsorized at the 1^{st} and 99^{th} percentile.

	Obs	**Mean**	**S.D.**	**Q1**	**Mdn**	**Q3**
CompAcctInd	38071	-2.712	3.07	-3.09	-1.70	-1.00
AQ_DD	26828	0.109	0.13	0.03	0.06	0.13
Disc_AQ_DD	19753	-0.052	0.44	-0.37	-0.03	0.28
Disc_ACC_ABS	21020	0.331	0.66	0.04	0.10	0.28
REM	20769	0.026	0.61	-0.19	0.05	0.30
HHI	38071	0.081	0.07	0.04	0.06	0.10
d_MHHI	38059	0.210	0.14	0.11	0.18	0.26
Growth_Opportunities	37957	0.664	0.59	0.31	0.53	0.85
ROA	37866	-0.006	0.19	-0.01	0.02	0.07
Equity_Raised	35187	0.045	0.13	0.00	0.01	0.02
Leverage	37825	0.213	0.21	0.03	0.16	0.33
Firm_Size	37957	5.919	2.07	4.38	5.88	7.33
IO	30835	0.519	0.31	0.25	0.54	0.78
IO_hhi	30844	0.149	0.18	0.04	0.07	0.17

Table 3.2: **Correlation Matrix.** The table provides Pearson correlation matrix for the main variables used in this study. * Significant at 5% confidence level or better.

	CompAcctInd	AQ_DD	Disc_AQ_DD	Disc_ACC	REM	HHI	d_MHHI	Growth	ROA	Equity	Leverage	Size	IO	IO_hhi
CompAcctInd	1													
AQ_DD	-0.4767*	1												
Disc_AQ_DD	0.0819*	-0.2087*	1											
Disc_ACC	-0.0775*	0.1202*	-0.0426*	1										
REM	0.0400*	-0.1312*	0.0301*	-0.0233*	1									
HHI	-0.0469*	-0.0833*	0.0479*	-0.1072*	-0.0146*	1								
d_MHHI	0.0206*	0.0404*	0.0983*	0.0711*	0.004	-0.1179*	1							
Growth	-0.1673*	-0.0910*	-0.1259*	-0.0278*	0.1138*	0.0569*	-0.0921*	1						
ROA	0.4178*	-0.4918*	0.1154*	-0.0853*	0.1016*	0.0734*	-0.0339*	0.0067	1					
Equity	-0.1940*	0.3704*	-0.1368*	0.0658*	-0.1109*	-0.0855*	0.0051	-0.1927*	-0.5645*	1				
Leverage	-0.0703*	-0.1041*	0.3160*	-0.0610*	0.0629*	0.0527*	0.0110*	-0.0486*	-0.0331*	-0.1292*	1			
Size	0.2970*	-0.3259*	0.7898*	-0.0478*	0.0130*	0.0340*	0.0926*	-0.3798*	0.2815*	-0.0703*	0.0947*	1		
IO	0.1363*	-0.2369*	0.5867*	-0.0266*	0.0164*	0.0553*	0.0813*	-0.2133*	0.1890*	-0.1133*	0.0773*	0.6431*	1	
IO_hhi	-0.1670*	0.2010*	-0.5588*	0.0198*	-0.0036	-0.0057	-0.0943*	0.2316*	-0.1599*	0.0409*	-0.0133*	-0.6339*	-0.6065*	1

Table 3.3: **Association between Accounting Comparability and Common Ownership.** This table shows the association between common ownership and Industry Accounting Comparability. In Columns (1) we present the results for Industry Accounting Comparability after controlling for known determinants of financial reporting quality. To rule out the possibility that the results are capturing the effect of shareholders characteristics, in Column (2) we also control for institutional ownership and ownership concentration. All regressions include firm and year fixed effects. Standard errors are clustered at the firm level. *, **, and *** represent statistical significance at the 10%, 5% and 1% level, respectively.

	CompAcctInd (1)	CompAcctInd (2)
d_MHHI	0.866***	1.071***
	(3.391)	(3.972)
HHI	-0.708	-0.413
	(-0.842)	(-0.460)
IO		0.487***
		(2.705)
IO_hhi		0.159
		(0.777)
Growth_Opportunities	-0.418***	-0.403***
	(-5.087)	(-4.778)
ROA	2.221***	2.116***
	(12.12)	(10.60)
Equity_Raised	0.0271	-0.275
	(0.132)	(-1.332)
Leverage	-0.650***	-0.541***
	(-3.742)	(-3.089)
Firm_Size	0.265***	0.208***
	(6.187)	(4.414)
L.CompAcctInd	0.729***	0.719***
	(43.62)	(36.13)
Disc_ACC	-0.0453**	-0.0163
	(-2.311)	(-0.820)
REM	-0.0331	-0.0171
	(-1.324)	(-0.742)
Observations	16,854	14,345
R-squared	0.498	0.497
Year FE	YES	YES
Firm FE	YES	YES

Table 3.4: **Association between Earrings Management and Common Ownership.** This table shows the association between common ownership and Financial Reporting Quality. In Columns (1) to (4) we present the results for accruals quality (DD), discretionary accruals quality (DD), unsigned discretionary accruals (Modified Jones) and, real earnings management, respectively, after controlling for known determinants of financial reporting quality, institutional ownership and ownership concentration. All regressions include firm and year fixed effects. Standard errors are clustered at the firm level. *, **, and *** represent statistical significance at the 10%, 5% and 1% level, respectively.

	AQ_DD	Disc_AQ_DD	Disc_ACC	REM
	(1)	(2)	(3)	(4)
d_MHHI	-0.0121	0.000413	-1.040***	-0.118*
	(-1.475)	(0.0318)	(-10.37)	(-1.793)
HHI	-0.0153	-0.0241	0.633***	-0.728***
	(-0.539)	(-0.505)	(3.642)	(-5.488)
IO	-0.00727	0.0174	-0.0400	0.0822
	(-1.296)	(1.530)	(-0.748)	(1.589)
IO_hhi	-0.00264	-0.0165	-0.0377	-0.00452
	(-0.354)	(-1.310)	(-0.497)	(-0.0883)
Growth_Opportunities	-0.000840	0.00360	-0.00532	0.0942***
	(-0.371)	(0.982)	(-0.276)	(6.743)
ROA	-0.0284***	-0.0262**	-0.0593	0.0222
	(-3.727)	(-2.176)	(-1.025)	(0.455)
Equity_Raised	0.00805	0.00720	0.0422	0.154*
	(0.647)	(0.288)	(0.423)	(1.941)
Leverage	-0.00868	-0.0281*	-0.0155	0.145**
	(-1.254)	(-1.721)	(-0.219)	(2.497)
Firm_Size	-0.00310*	0.00789*	-0.0320**	0.0309***
	(-1.777)	(1.890)	(-2.188)	(2.626)
L.Dependent_Variable	0.602***	0.740***	-0.0511***	0.0401***
	(30.91)	(30.07)	(-3.173)	(3.537)
REM	-0.00128	-0.00301*	-0.116***	
	(-1.437)	(-1.692)	(-4.768)	
Disc_ACC_ABS				-0.0755***
				(-4.767)
Observations	13,615	10,621	14,785	14,665
R-squared	0.416	0.658	0.103	0.047
Year FE	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES

Table 3.5: **Association between Financial Reporting Quality and Common Ownership.** This table shows the association between common ownership and proxies of financial reporting quality. In Columns (1) to (5) we present the results for accounting comparability, accruals quality (DD), discretionary accruals quality (DD), unsigned discretionary accruals (Modified Jones) and, real earnings management, respectively, in which all dependent variables are regressed with a lead. All regressions include firm and year fixed effects. Standard errors are clustered at the firm level. *, **, and *** represent statistical significance at the 10%, 5% and 1% level, respectively.

	$CompAcctInd_{t+1}$	AQ_DD_{t+1}	$Disc\_AQ\_DD_{t+1}$	$Disc\_ACC_{t+1}$	REM_{t+1}
	(1)	(2)	(3)	(4)	(5)
d_MHHI	0.871**	-0.0241**	-0.0233	-0.603***	-0.177**
	(2.570)	(-2.275)	(-1.107)	(-6.417)	(-2.547)
HHI	-1.217	0.0376	0.0333	0.338*	-0.692***
	(-1.052)	(0.908)	(0.425)	(1.940)	(-4.834)
IO	0.531**	-0.00813	0.0204	-0.194***	0.0411
	(2.075)	(-1.039)	(1.125)	(-2.991)	(0.794)
IO_hhi	0.408	-0.00356	-0.00640	-0.00680	-0.0408
	(1.316)	(-0.327)	(-0.313)	(-0.0822)	(-0.651)
Growth_Opportunities	-0.748***	-0.00193	0.00253	0.000767	0.0778***
	(-6.151)	(-0.570)	(0.427)	(0.0382)	(4.767)
ROA	2.985***	-0.0598***	-0.0742***	0.0184	0.0296
	(10.43)	(-6.070)	(-3.963)	(0.279)	(0.566)
Equity_Raised	0.355	-0.000466	-0.00428	-0.0913	-0.0116
	(1.314)	(-0.0285)	(-0.164)	(-0.761)	(-0.118)
Leverage	-0.670**	-0.0106	-0.0314	-0.0421	0.201***
	(-2.334)	(-1.049)	(-1.271)	(-0.523)	(3.488)
Firm_Size	0.0971	-0.00526**	0.00962	0.00224	0.0454***
	(1.366)	(-2.261)	(1.399)	(0.139)	(3.510)
L.Dependent_Variable	0.303***	0.307***	0.499***	-0.155***	-0.157***
	(13.26)	(13.25)	(14.57)	(-15.02)	(-8.502)
REM	-0.0174	0.00127	-0.000541	-0.0117	
	(-0.600)	(1.051)	(-0.243)	(-0.481)	
Disc_ACC_ABS	-0.00387				0.0102
	(-0.149)				(1.299)
Observations	12,202	11,645	9,115	13,596	13,424
R-squared	0.242	0.161	0.431	0.118	0.058
Year FE	YES	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES	YES

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Appendix A

Appendix to Chapter 1

A.1 Variable definitions

Variable Name	Description	call report Code	RIS Code
Accretive_ALLP_T1	Dummy variable that takes the value of one when ALLP net of taxes increases regulatory capital through Tier 1 by at least 0.05%, and zero otherwise.		
Accretive_ALLP_T2	Dummy variable that takes the value of one when ALLP times taxes increases regulatory capital through Tier 2 by at least 0.05%, and zero otherwise.		
Accretive_ARWA	Dummy variable that takes the value of one when ARWA increases regulatory capital by at least 0.05%, and zero otherwise.		
Accretive_EqTS	Dummy variable that takes the value of one when EqTS increases regulatory capital by at least 0.05%, and zero otherwise.		
Accretive_RGL	Dummy variable that takes the value of one when RGL net of taxes increases regulatory capital by at least 0.05%, and zero otherwise.		
ALLP	Abnormal component of LLP (following Beatty and Liao, 2014) multiplied by lagged total assets and normalized by net risk-weighted assets. See Internet Appendix for more details.		
ARWA	Abnormal component of risk weighted assets is the increase in regulatory capital (relative to risk weighted assets) due to the alternative distribution of asset classes, holding total assets constant.	RCONB700, RCONB701, RCONB702, RCONB703, RCON1651, RCONA222, RCON3128, RCFD8274, RCFD8275, RCFDA223	asset0, asset20, asset50, asset100, rwamktrk, atrres, rbclnrsw, rbct1w, rbct2w, rwajt
Asset_Quality	Loan loss allowance normalized by lagged total assets.	RCFD3123, RCFD2170	lnlsres, asset

Variable Name	Description	Call Rep. Code	RIS Code
Brokered_Deposits	Brokered deposits normalized by lagged total deposits.	RCON2365, RCFD2200	bro, dep
Capital_Adequacy	Equity normalized by lagged total assets.	RCFD3210, RCFD2170	eq, asset
Def_RegCap_ALLP	Difference between the 10% threshold and RegCap_ALLP.		
Def_RegCap_ARWA	Difference between the 10% threshold and RegCap_ARWA.		
Def_RegCap_EqTS	Difference between the 10% threshold and RegCap_EqTS.		
Def_RegCap_RGL	Difference between the 10% threshold and RegCap_RGL.		
Earnings	Income before taxes net of RGL and LLP normalized by lagged total assets.	RIAD4301, RIAD3196, RIAD4230, RCFD2170	ibeftax, iglsca, elnlos, asset
EqTS	Transactions with parent holding company plus sale of capital stock normalized by net risk-weighted assets.	RIAD4415, RIADB509, RCFDA223	eqcbhctr, eqcstkx, rwajt
Liquidity	Cash normalized by lagged total assets.	RCFD0010, RCFD2170	chbal, asset
LLP	Loan loss provision of the quarter normalized by lagged total assets.	RIAD4230, RCFD2170	elnlos, asset
Ln_ZScore	Natural logarithm of $(ROA + CAR)/Sd\_ROA$, where ROA is the mean of return on assets before RGL and LLP normalized by lagged total assets, CAR is the equity capital asset ratio, and Sd_ROA is the standard deviation of ROA estimated over 3 years.	RIAD4340, RIAD3196, RIAD4230, RCFD3210, RCFD2170	netinc, iglsca, elnlos, eq, asset
Loan	Total loans normalized by lagged total assets.	RCFD2122, RCFD2170	lnlsgr, asset
Low_RegCap_ALLP	Dummy variable that takes the value of one when RegCap_ALLP is lower than 10%, and zero otherwise.		
Low_RegCap_ARWA	Dummy variable that takes the value of one when RegCap_ARWA is lower than 10%, and zero otherwise.		
Low_RegCap_EqTS	Dummy variable that takes the value of one when RegCap_EqTS is lower than 10%, and zero otherwise.		
Low_RegCap_RGL	Dummy variable that takes the value of one when RegCap_RGL is lower than 10%, and zero otherwise.		
Mgmt_Quality	Non-interest expenses normalized by lagged total assets.	RIAD4093, RCFD2170	nonix, asset
Public	Dummy variable that takes the value of one if the bank belongs to a BHC that is publicly traded, and zero otherwise.		
RegCap	The sum of Tier 1 and Tier 2 capital normalized by net risk-weighted assets.	RCFD8274, RCFD8275, RCFDA223	rbct1w, rbct2w, rwajt
RegCap_ALLP	Regulatory capital plus abnormal loan loss provision net of taxes.	RCFD8274, RCFD8275, RCFDA223, RCFD2170	rbct1w, rbct2w, rwajt, asset
RegCap_ARWA	The sum of Tier 1 and Tier 2 over risk weighted assets of the previous period.	RCONB700, RCONB701, RCONB702, RCONB703, RCON1651, RCONA222, RCON3128, RCFD8274, RCFD8275	asset0, asset20, asset50, asset100, rwamk-trk, atrres, rbclnrsw, rbct1w, rbct2w
RegCap_EqTS	Regulatory capital minus equity transfers and sales.	RCFD8274, RCFD8275, RCFDA223, RIAD4415, RIADB509	rbct1w, rbct2w, rwajt, eqcbhctr, eqcstkx
RegCap_RGL	Regulatory capital minus realized gains and losses on available-for-sale securities net of taxes.	RCFD8274, RCFD8275, RCFDA223, RIAD3196	rbct1w, rbct2w, rwajt, iglsca
RGL	Realized gains and losses on available-for-sale securities normalized by net risk-weighted assets.	RIAD3196, RCFDA223	iglsca, rwajt
Sens_Mkt_Risk	Non-interest income normalized by lagged total assets.	RIAD4079, RCFD2170	nonii, asset
Size	Natural logarithm of total assets.	RCFD2170	asset

A.2 Marginal tax rate

To calculate the marginal tax rate, we follow Graham and Mills (2008). We use the specification that proxies for the simulated marginal tax rate ($TaxSimMTR$) as follows:

$$\begin{aligned} TaxSimMTR_{it} = 0.336 - 0.034 * USBookLoss_{it} - 0.082 * LowUSETR_{it} \\ - 0.028 * NOL_{it} - 0.09 * BookLoss_{it} \end{aligned} \tag{A.1}$$

where $USBookLoss$ is a dummy variable that takes the value of 1 if income before taxes is negative, and zero otherwise. $LowUSETR$ is a dummy that takes the value of 1 if the current effective tax rates (income taxes/income before taxes) are smaller than 10%, and zero otherwise. Net operating losses, NOL, proxies the tax loss carry forward.[1] It takes the value of 1 when there is a loss and net deferred income taxes are positive, and zero otherwise. In our setting, we do not have information on banks outside U.S. jurisdiction; therefore, $BookLoss$ is calculated in the same fashion as $USBookLoss$, and we do not include a dummy to capture the presence of substantial foreign income. The reason for differentiating between US and worldwide losses is that banks can report losses in the US while they are profitable worldwide.[2] For banks registered as S corporations,[3] we replace Graham and Mills' specification of the marginal tax rate with the income tax rate. Because S corporations do not pay federal taxes but do pay state taxes in some cases, we cannot compute the marginal tax rate as zero, and Eq. A.1 might create a bias.

[1] We do not observe this value directly in our database.

[2] Just a few large banks might have operations outside the country, but it is very unlikely that they report U.S. losses when they are profitable worldwide.

[3] Since 1997, small banks, if they meet certain conditions, can choose to transfer corporate income to their shareholders for federal taxation.

A.3 Correlation matrix

In this section we present Pearson (Spearman) correlations below (above) the diagonal. Although almost all correlations are significantly different from zero, most of them are less than 0.25. Notably, correlation coefficients of our $Accrevite\_X$ variables are low among them. The latter, suggest that they are capturing different forms of regulatory capital management.

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
(1)	RegCap		**0.064**	**-0.023**	0.003	**-0.145**	**0.033**	**0.106**	**-0.085**	**-0.089**	**0.180**	**-0.019**	**-0.021**	**0.050**	**0.014**	**0.044**	**-0.024**	**-0.020**	**-0.203**
(2)	Accretive_ALLP_T1	**0.059**		**-0.040**	**0.017**	**-0.040**	-0.004	**-0.026**	**-0.037**	0.001	**-0.038**	**0.308**	**-0.020**	**-0.018**	-0.007	**-0.013**	**0.023**	**0.016**	-0.039
(3)	Accretive_ALLP_T2	**-0.031**	**-0.044**		**0.022**	**0.018**	**0.020**	**-0.041**	0.001	**0.016**	**0.015**	**-0.098**	**0.009**	**-0.018**	-0.002	-0.008	**-0.017**	**-0.021**	**0.006**
(4)	Accretive_RGL	-0.002	**0.018**	**0.017**		**0.016**	**0.026**	**-0.083**	**-0.029**	0.007	**-0.054**	**-0.011**	**0.029**	**-0.096**	**0.017**	-0.006	**-0.012**	**0.016**	**-0.119**
(5)	Accretive_EqTS	**-0.115**	**-0.035**	**0.014**	**0.020**		**0.027**	**-0.091**	**0.071**	**0.143**	**-0.013**	**0.055**	**0.028**	**-0.099**	**-0.046**	**-0.060**	**0.051**	**0.059**	**0.143**
(6)	Accretive_ARWA	**0.026**	-0.004	**0.020**	**0.025**	**0.026**		**-0.071**	**0.203**	**0.037**	-0.007	**0.059**	**0.027**	**-0.019**	**-0.035**	**-0.018**	**-0.017**	**-0.025**	**0.070**
(7)	Ln_ZScore	**0.155**	**-0.030**	**-0.048**	**-0.065**	**-0.067**	**-0.074**		**-0.158**	**-0.044**	**0.092**	**-0.119**	**-0.252**	**0.224**	**-0.114**	**0.056**	**0.157**	**0.286**	**-0.035**
(8)	Total_Deposits	**-0.099**	**-0.051**	**0.021**	**-0.040**	**0.042**	**0.192**	**-0.163**		**-0.177**	**-0.088**	**-0.017**	**0.195**	**-0.024**	**0.179**	**-0.063**	**-0.252**	**-0.325**	**0.081**
(9)	Brokered_Deposits	**-0.057**	0.001	0.003	**0.028**	**0.164**	**0.046**	**-0.059**	**-0.107**		**0.166**	**0.208**	**-0.165**	**-0.041**	**-0.264**	**-0.144**	**0.104**	**0.201**	**0.300**
(10)	Capital_Adequacy	**0.134**	0.004	-0.001	**-0.016**	**0.025**	**-0.015**	**0.046**	**-0.115**	**0.125**		**0.137**	**-0.017**	**0.127**	**-0.103**	**-0.042**	**0.129**	**0.123**	**0.296**
(11)	Asset_Quality	**-0.030**	**0.259**	**-0.087**	0.004	**0.045**	**0.073**	**-0.176**	**-0.064**	**0.158**	**0.177**		-0.004	**0.120**	**-0.044**	**-0.065**	**0.072**	**0.065**	**0.359**
(12)	Mgmt_Quality	**-0.068**	**-0.008**	**0.028**	**0.012**	**0.014**	**0.028**	**-0.327**	**0.132**	**-0.090**	**0.104**	**0.150**		**-0.246**	**0.314**	**0.499**	**-0.132**	**-0.197**	**-0.009**
(13)	Earnings	**0.083**	**-0.030**	**-0.006**	**-0.089**	**-0.096**	**-0.030**	**0.220**	**-0.038**	**-0.074**	**0.063**	**0.075**	**-0.153**		-0.004	**0.266**	**0.186**	**0.229**	**0.188**
(14)	Liquidity	-0.001	**0.008**	**0.009**	**0.008**	**-0.037**	**-0.034**	**-0.153**	**0.107**	**-0.158**	-0.002	**0.013**	**0.283**	**-0.008**		**0.176**	**-0.087**	**-0.192**	**-0.163**
(15)	Sens_Mkt_Risk	**0.009**	-0.005	**0.010**	-0.002	**-0.018**	-0.005	**-0.107**	**-0.121**	**-0.054**	**0.062**	**0.080**	**0.655**	**0.289**	**0.184**		**0.139**	**0.223**	**-0.151**
(16)	Public	0.002	**0.045**	**-0.024**	-0.002	**0.045**	**-0.017**	**0.114**	**-0.274**	**0.048**	**0.129**	**0.074**	**-0.038**	**0.149**	**-0.009**	**0.155**		**0.429**	**-0.026**
(17)	Size	**0.012**	**0.056**	**-0.039**	**0.033**	**0.071**	**-0.024**	**0.235**	**-0.435**	**0.126**	**0.142**	**0.086**	**-0.109**	**0.205**	**-0.087**	**0.241**	**0.493**		**-0.043**
(18)	Loan	**-0.174**	**-0.038**	0.004	**-0.091**	**0.140**	**0.067**	0.006	**0.051**	**0.277**	**0.263**	**0.281**	**0.012**	**0.168**	**-0.178**	**-0.063**	**-0.032**	**-0.048**	

Table A.1: **Correlation matrix.** The table shows the Pearson (Spearman) correlations below (above) the diagonal. Correlations in bold are significant at the 5% level. Sample period is 1996:Q1–2009:Q4 restricting the interval to $\pm 2\%$ around the 10% threshold of regulatory capital. Because of data availability, the analysis for $ARWA$ starts in 2001:Q1. All variables are defined in Appendix A.

A.4 Discontinuity at the Bank Holding Company level

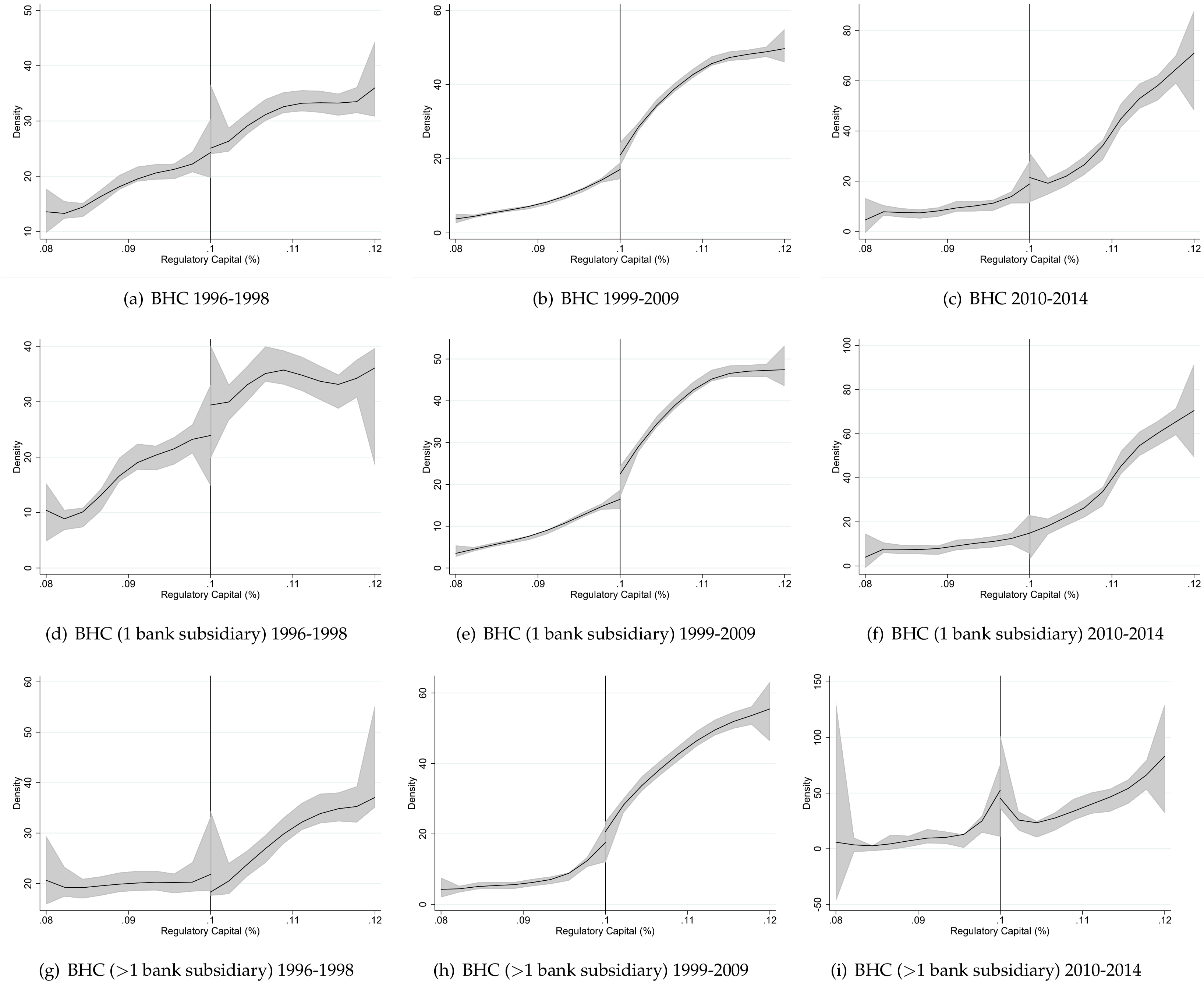
In this Section we replicate the analysis of the discontinuity around the 10% threshold at the Bank Holding Company (BHC) level using quarterly data for the period 1996 to 2014. We keep all domestic top-tier BHCs with positive total assets and loans and estimate regulatory capital as Tier1 (item bhck8274) plus Tier 2 (item bhck8275), divided by risk weighted assets (item bhcka223), from files FR Y-9C (retrieved from WRDS).

BHCs are also required to maintain minimum capital ratios, but we are not aware of any direct benefit they might extract from exceeding the 10% threshold. The Prompt Corrective Action (PCA) is directed to insured depository institutions and only affects BHCs indirectly, through their subsidiaries.

Bank Holding Companies have incentives to keep all their banking subsidiaries well-capitalized. First, the Federal Reserve (the agency that supervises BHC) uses call reports as inputs in its supervisory process **(Board of Governors of the Federal Reserve System (US). Division of Banking Supervision and Regulation, (2019), Section 1050.0, pp.3)**. Second, reporting a low regulatory capital at the subsidiary level might draw regulatory scrutiny even if the BHC has enough capital as a group. This is even so if this subsidiary is sufficiently important and might affect other subsidiaries within the BHC **(Board of Governors of the Federal Reserve System (US). Division of Banking Supervision and Regulation, (2019), Section 1050.0, pp.1)**. Moreover, the FDICIA gives the Federal Reserve's authority "to force a parent to sell a non-banking subsidiary if the parent refused to use non-banking assets to support a troubled affiliate" (Ashcraft, 2008, pp.289). Third, some regulations grant benefits and impose costs depending on the banking subsidiaries' regulatory capital, regardless of the BHC (or top holder) capitalization. For instance, the FDIC Assessment Rates impose higher insurance premiums for commercial banks that are less than well capitalized; a BHC must certify that all of its depository institution subsidiaries are well-managed and well-capitalized in order to become a financial holding company.

Whether there is a discontinuity around the 10% regulatory capital ratio for BHC (at the top holder bank) is ultimately an empirical question. Because the regulatory capital at the BHC level (or top holder) will be the aggregation of the regulatory capital of their subsidiaries, such discontinuity is ex-ante less likely to exist, because it would require that all the banking subsidiaries would be reporting ratios close to the 10%. Besides, a BHC might have non-banks, making things even more complicated because their assets and equity also enter the calculation of the BHC ratios.

Following Figure 1, using local polynomial density estimation (Calonico et al., 2014, 2017), we test whether there is a discontinuity in the distribution of regulatory capital for BHCs in three different sample periods: (i) Pre Gramm-Leach-Bliley Act (1996-1998), plot (ii) Post Gramm-Leach-Bliley Act until Basel III (1999-2009), and (iii) Basel III (2010-2014). Panels (a) to (c) present the results for all the BHCs. Results indicate that there is a small discontinuity for the period 1999-2009. Neither the economic nor the statistical significance (t-stat = 2.19) are as large as they are for the analysis at the commercial bank level. We further divide the sample into BHC with only one bank subsidiary (Panels (d) to (f)), and BHC with more than one (Panels (g) to (i)), and find that the results are driven by the former.



(a) BHC 1996-1998

(b) BHC 1999-2009

(c) BHC 2010-2014

(d) BHC (1 bank subsidiary) 1996-1998

(e) BHC (1 bank subsidiary) 1999-2009

(f) BHC (1 bank subsidiary) 2010-2014

(g) BHC (>1 bank subsidiary) 1996-1998

(h) BHC (>1 bank subsidiary) 1999-2009

(i) BHC (>1 bank subsidiary) 2010-2014

Figure A.1: **Discontinuity for BHCs.** The figure presents the discontinuity for BHC in the Pre Gramm-Leach-Bliley Act (1996-1998, first column), Post Gramm-Leach-Bliley Act until Basel III (1999-2009, second column), and post-crisis period (2010-2014). Panels (a) to (c) present the results for all the BHCs. Panels (d) to (f) include BHC with only one bank subsidiary and Panels (g) to (i), BHC with more than one subsidiary.

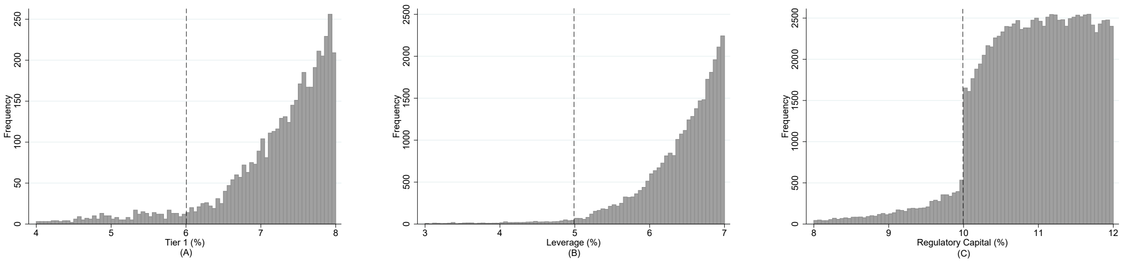
A.5 Discontinuity for all capital ratios

In this section, we explore the possibility that other capital ratios present a discontinuity in their distribution. According to the Prompt Corrective Actions of 1991, banks to be well-capitalized need to have the regulatory capital above 10%, Tier 1 above 6%, and leverage ratio above 5%. In the paper, we show a discontinuity at the threshold in the regulatory capital ratio. If the other two ratios are binding for the banks, we then should observe a discontinuity at their thresholds. Figure A.2 shows that there is no pronounced kink at the thresholds of Tier 1 and leverage ratio (Panels (A) and (B)). Even there is a significant discontinuity in leverage ratio (t-stat=1.96), the bins just below and above the thresholds contain only 44 and 68 bank-quarter observations. These observation numbers are relatively small if they are compared to the bins just below and above the regulatory capital threshold (Panel (C)). Additionally, we find that when the regulatory capital is above 10%, in general, the other two ratios exceed their thresholds. We have only 0.02% of cases (99 bank-quarter observations) in which this is not the case. Therefore, we interpret these results as evidence that the relevant ratio for commercial banks is the regulatory capital ratio.

We also examine whether there is a kink in the capital ratios in the enforceable phase of Basel III. Under the new Basel III framework, Prompt Corrective Actions requires well capitalized banks to hold tier 1 of 8%, leverage ratio of 5%, common equity tier 1 of 6.5%, and regulatory capital ratio of 10% as minimum figures.[4] Figure A.3 plots the histograms of the previous ratios around the thresholds for the period 2015-2018.[5] The histograms present no kink or discontinuity at the thresholds of tier 1, leverage, and common equity. However, there is a small kink in the regulatory capital ratio in which the bin just below only has 4 observations and the bin just above it has only 22 observations. The fact of having multiple threshold that affect banks' ability to meet all of them at the same time have diminished the relevance of the thresholds.

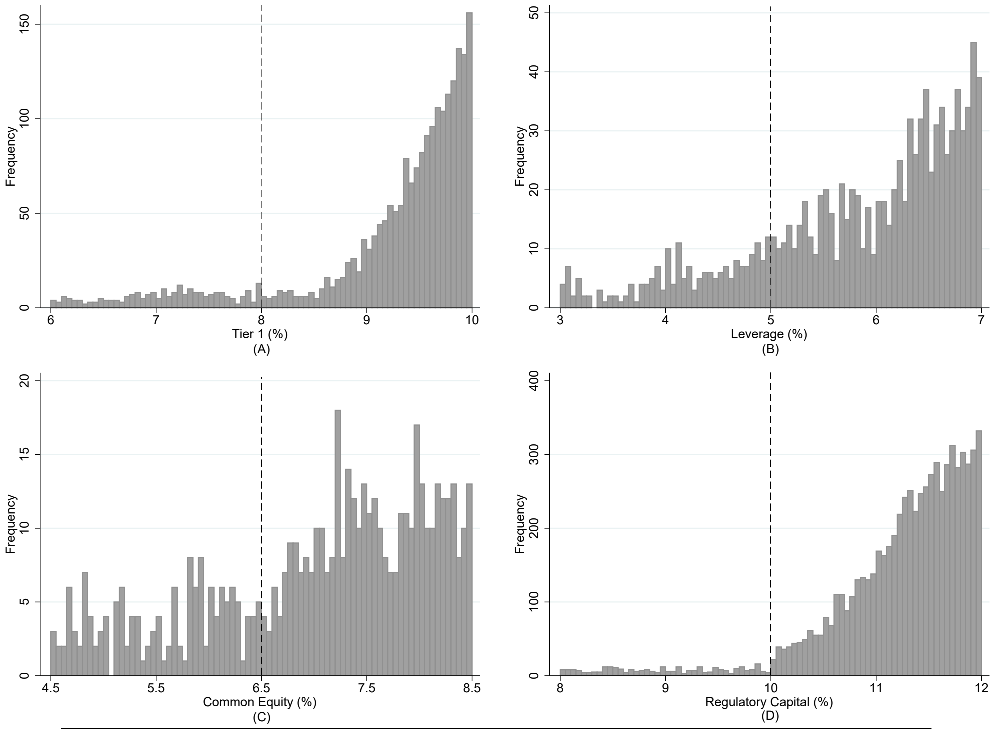
[4]The supplementary leverage ratio as a requirement applies only to advanced approaches banking organizations and the minimum is 3%.

[5]Starting in 2015 quarter 1, banks are required to report new ratios in Call Reports.



	Tier 1 (A)	Leverage (B)	Reg Cap (C)
Below 10%	12	44	533
Above 10%	14	68	1,651
Above/Below	1.17	1.55	3.10
Calonico et al. T-Stat	0.84	1.96	16.91

Figure A.2: **Discontinuity for capital ratios.** Panel (A) plots the histogram of reported Tier 1 around the 6% threshold. Panel (B) plots the histogram of reported Leverage around the 5% threshold. Finally, Panel (C) plots the histogram of reported regulatory capital around the 10% threshold. Results are plotted for the main sample period (1996-2009) and interval widths are 0.0005. T-stat is calculated using local polynomial density estimation (polynomial of order 2) (Calonico et al., 2014, 2017)



	Tier 1 (A)	Leverage (B)	Comm. Eq. (C)	Reg Cap (D)
Below 10%	13	12	5	4
Above 10%	6	12	4	22
Above/Below	0.46	1.00	0.80	5.50
Calonico et al. T-Stat	-1.30	-0.73	-0.36	2.59

Figure A.3: **Discontinuity for capital ratios after Basel III.** Panel (A) plots the histogram of reported Tier 1 around the 8% threshold. Panel (B) plots the histogram of reported Leverage around the 5% threshold. Panel (C) plot the histogram of reported Common Equity around 6.5%. Finally, Panel (D) plots the histogram of reported regulatory capital around the 10% threshold. Results are plotted for the period (2015-2018) and interval widths are 0.0005. The t-statistics is calculated using local polynomial density estimation (polynomial of order 2) (Calonico et al., 2014, 2017)

A.6 Brokered Deposits

In this section, we explore whether banks react to incentives to gain (unrestricted) access to brokered deposits. The FDICIA explicitly states that banks that are only adequately capitalized need a waiver to accept, renew or roll over brokered deposits (and imposes restrictions on the interest rate banks can offer on them).[6] Figure A.4, Panel (A) provides the graphical representation of the distribution of the proportion of brokered deposits to total deposits by the levels of regulatory capital. A graphical inspection reveals a jump in brokered deposits from 9.5% to 10% of regulatory capital. The mean of broker deposits as a proportion of total deposits jumps from 3.01% to 4.99%, and the respective confidence intervals are not overlapping, which means that this difference is significant.[7] Panel (B) provides graphical evidence of a sharp increase in brokered deposits for banks that report regulatory capital above the 10% threshold (t-stat=2.55), which is consistent with the FDICIA creating a wedge in the cost of this source of financing for adequately capitalized and well-capitalized banks. A discontinuity in brokered deposits might arise if the (pecuniary and non-pecuniary) costs of the waiver are sufficiently large or the probability of being granted the waiver fall sharply below the threshold. Based on information provided by the FDIC, the latter seems not to be the case: between 1996 and 2009, 369 waivers were submitted and only 3 were denied. This figure suggests that the cost of the waiver might preclude banks from asking for permission to operate with these deposits.

Because brokered deposits and equity are alternative sources of financing for banks (Barth and Sun, 2018), keeping core deposits constant, there should be a negative relationship between regulatory capital and (changes in) brokered deposits. However, the FDICIA creates a kink in the relationship at the 10% threshold through a higher cost to banks below the threshold. In particular, banks just to the left still have positive

[6]A bank that is not well capitalized are not allowed to offer interest rates more than 75 basis points above average national rates for deposits of similar size and maturity.

[7]It worth mentioning that the fraction of brokered deposit is particularly high for low values of regulatory capital. The latter is explained by the small volume of total deposits rather than a high volume of brokered deposits.

changes in brokered deposits (which is consistent with FDIC granting the waiver), but the changes are lower as bank capitalization falls. Banks further away from the discontinuity may be less likely to ask for the waiver since they can expect a lower chance of getting it.

To analyze this relationship more formally and to control for other determinants of brokered deposits, we estimate the following regression:

$$\Delta BrokeredDeposits_{it} = \beta_1 Low\_RegCap_{i,t} + \sum_{n=1}^{k} \beta_{2k} Def\_RegCap_{i,t}^{k} +$$

$$+ \sum_{n=1}^{k} \beta_{3k} Def\_RegCap_{i,t}^{k} \times Low\_RegCap_{i,t} + \gamma Controls_{i,t-1} + \eta_i + \theta_t + \varsigma_j + \epsilon_{it} \quad \text{(A.2)}$$

where $\Delta BrokeredDeposits$ is the change in brokered deposits in the following year relative to the previous year, while Low_RegCap is a dummy variable that takes a value of one if $RegCap$ is below the 10% level and zero otherwise, it and represents the discontinuity at the threshold (Roberts and Whited, 2013). Def_RegCap is the distance between the 10% threshold and the reported regulatory capital. The interaction with the indicator variable, Low_RegCap, allows for different shapes in the polynomials to the right and to the left of the discontinuity. $Controls_{i,t-1}$ includes a set of control variables that have been previously used in the literature, such as proxies for CAMELS ratings ($Assets\_Quality, Mgmt\_Quality, Earnings, Liquidity, Sensitivity\_Mkt\_Risk$), bank size ($Size$), the fraction of loans to assets ($Loan$), and an indicator variable equal to 1 if the bank is publicly traded ($Public$). We also include time fixed effects, θ_t, and supervisor fixed effects, ς_j, in all our specifications. We use three alternative bandwidths around the threshold, $\pm 0.25\%$, $\pm 0.5\%$, and $\pm 2\%$. For the broader interval, we include bank fixed effects, η_i, and include second-order polynomials. For the smaller intervals, we estimate a linear specification (Roberts and Whited, 2013). Standard errors are clustered at the bank level.

Tables A.2 provides results for the multivariate analysis to account for other determinants of brokered deposits. Columns (1) to (5) show that β_1 is negative and statistically significant using alternative bandwidths and polynomial orders, consistent with banks with low regulatory capital having discontinuously less growth in this source of funding in the following year and in line with the results presented in Figure A.4. The effect is economically significant: the estimate in Column (1) implies that the change in brokered deposits is 13.6% lower for banks just below the threshold (the unconditional mean is 1.47%).[8] Regarding the control variables, banks that are larger, those that have a higher fraction of loans relative to total assets and public banks have a positive association with changes in brokered deposits. Banks that have higher liquidity rely less on this type of financing, as expected. The rest of the control variables are, in general, statistically insignificant.

Because brokered depositors are sophisticated depositors, they might pay attention to regulatory capital and the level of coverage of non-performing loans (non-performing loans divided by loan loss reserves). We re-run the regressions controlling for non-performing loans' coverage and find this additional control is negative and statistically significant, but it does not affect the main results. Finally, in untabulated results, we re-run the regressions for the period 2010-2014 and find no effect after the most recent financial crisis.

[8] This is a conservative estimate of the economic magnitude since the effect is larger using wider bandwidths.

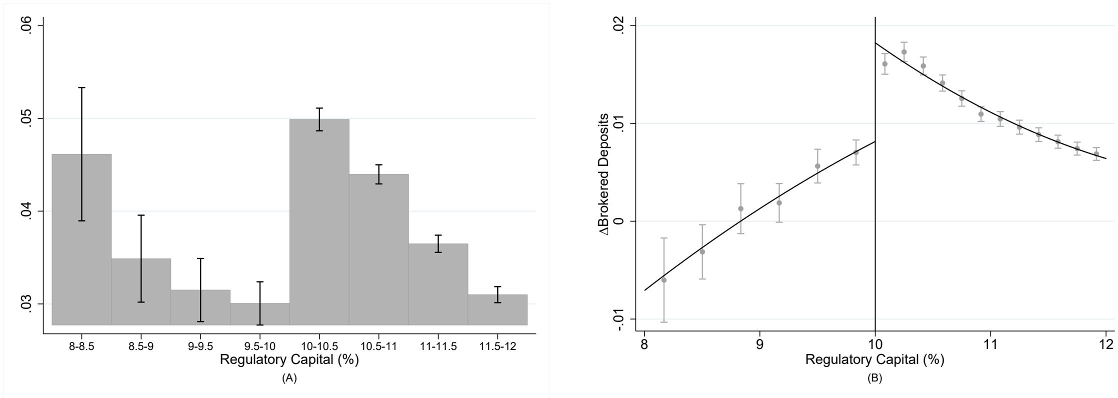


Figure A.4: **Brokered deposits by regulatory capital.** Panel (A) present the distribution of the proportion of brokered deposits by levels of regulatory capital. Panel (B) presents changes in brokered deposits in the following year as a function of the reported regulatory capital. Dots represent the sample average within the bin, and the vertical lines show the confidence intervals. The black lines show the polynomial fit. T-stat is 2.55 and it is calculated using local polynomial density estimation (polynomial of order 2) (Calonico et al., 2014, 2017).

	$\Delta BrokeredDeposits$				
	(1)	(2)	(3)	(4)	(5)
Low_RegCap	-0.002	-0.004	-0.002	-0.006	-0.004
	(-1.282)	(-2.958)	(-1.301)	(-5.396)	(-3.617)
Def_RegCap	-1.008	-0.131	-1.969	0.515	0.281
	(-1.683)	(-0.572)	(-2.436)	(3.954)	(2.496)
Def_RegCap^2			-358.606	12.000	5.612
			(-2.353)	(2.159)	(1.150)
$Def\_RegCap \times Low\_RegCap$	0.667	0.063	1.953	-1.093	-0.842
	(0.597)	(0.138)	(1.185)	(-3.407)	(-2.639)
$Def\_RegCap^2 \times Low\_RegCap$			347.429	-15.812	-16.067
			(1.081)	(-0.874)	(-0.893)
Size	0.002	0.002	0.002	0.001	0.000
	(3.081)	(3.661)	(3.630)	(4.942)	(0.450)
Loan	0.080	0.077	0.077	0.061	0.065
	(11.028)	(13.430)	(13.415)	(19.947)	(16.994)
Public	0.006	0.006	0.006	0.002	0.008
	(3.331)	(4.145)	(4.152)	(3.059)	(4.885)
Asset_Quality	0.020	0.030	0.030	-0.160	-0.808
	(0.123)	(0.225)	(0.230)	(-2.118)	(-8.420)
Mgmt_Quality	-0.238	-0.236	-0.237	0.087	0.329
	(-0.730)	(-0.857)	(-0.857)	(0.594)	(2.210)
Earnings	-0.059	-0.187	-0.186	-0.120	0.539
	(-0.183)	(-0.713)	(-0.708)	(-0.838)	(3.347)
Liquidity	-0.056	-0.065	-0.064	-0.042	-0.043
	(-3.605)	(-5.145)	(-5.131)	(-6.424)	(-5.422)
Sensitivity_Mkt_Risk	0.226	0.207	0.209	-0.076	-0.473
	(0.467)	(0.514)	(0.519)	(-0.349)	(-2.088)
Observations	10,844	23,147	23,147	99,960	99,427
Adj R-squared	0.125	0.118	0.118	0.092	0.316
Sample	± 0.25	± 0.50	± 0.50	± 2	± 2
Bank FE	No	No	No	No	Yes
Quarter-year FE	Yes	Yes	Yes	Yes	Yes
Supervisor FE	Yes	Yes	Yes	Yes	Yes

Table A.2: **Brokered deposits around the 10% threshold.** The table shows the relationship between reported regulatory capital and changes in brokered deposits in the following year. Each column presents the results for different bandwidths around the 10% threshold and polynomial orders for the deficit of regulatory capital and their interaction with the indicator variable for having regulatory capital below 10%. All variables are defined in Appendix A. Standard errors are clustered at the bank level. Robust t-values are reported below the coefficient estimates.

A.7 Model for Abnormal Loan Loss Provision

In this section, we report and compare the results of the preferred loan loss provision model of Beatty and Liao (2014) with our implementation of it. This model has been widely used in the accounting literature as a benchmark model (e.g., Jiang et al., 2016; Lim et al., 2016) in which loan loss provisions are estimated as a function of the change in past, current and future non-performing assets to reflect the possibility that banks use forward-looking and past information on non-performing loans. Beatty and Liao (2014)'s preferred model is the following:

$$\begin{aligned} LLP_{i,t} = &\alpha_0 + \alpha_1 \Delta NPA_{i,t+1} + \alpha_2 \Delta NPA_{i,t} + \alpha_3 \Delta NPA_{i,t-1} + \alpha_4 \Delta NPA_{i,t-2} + \alpha_5 Size_{i,t} \\ &+ \alpha_6 \Delta Loan_{i,t} + \alpha_7 \Delta Unemployment_t + \alpha_8 \Delta GDP_t + \alpha_9 RealEstateIndex_t + \epsilon_{i,t} \end{aligned} \tag{A.3}$$

where LLP is loan loss provision scaled by lagged total loans, ΔNPA is the change in non-performing assets scaled by lagged total loans, $Size$ is the natural logarithm of total assets, $\Delta Loan$ is the change in total loans divided by lagged total loans, $\Delta Unemployment$ is the change in unemployment rated over the quarter, ΔGDP is the change in GDP over the quarter, and $RealEstateIndex$ is the return on Case-Shiller Real Estate Index over the quarter. The residuals of the model are the abnormal component of the provisions.

The first difference between Beatty and Liao's model and our implementation of it comes from the variable definitions. We scale all variables by the lagged of total assets instead of total loans. We then re-scale $ALLP$ by risk-weighted assets to subtract the abnormal component of the provisions from the regulatory capital ratio. Instead of non-performing assets, we use non-performing loans. We compute it as the sum of total non-accrual loans and leases and total loans and lease financing receivables past due 90 or more days and still accruing interest. Unlike the preferred model, we use the change in the unemployment rate over the quarter and the change in GDP over the year both at the state level. We obtain these economic data from the Federal Reserve Bank of St. Louis and the Bureau of Economic Analysis, respectively. Finally, as $RealEstateIndex$, we use House Price Index by the state over the quarter from the Federal Housing Finance Agency. The second difference arises from the sample used. Beatty and Liao's sample contains Compustat data on bank holdings companies during the period 1993Q4-2012Q2. Our main sample contains Call Reports' data on commercial banks (private and publicly traded) during the period 1996Q1-2009Q4.

Table A.3 present the comparative results from the loan loss provision models. Column (1) replicates the results from Table 4, Model (a) from Beatty and Liao (2014). Columns (2) to (4), present the results using our implementation of the model. In Columns (2), we provide the results using all banks' data and in Column (3) and (4), we split the sample into public and private banks, respectively. Despite the difference in the implementation of the model mentioned above, results show that coefficients are similar in magnitude and statistical significance. In particular, when comparing banks holding companies with publicly traded banks (Columns (1) and (3)).

	LLP			
	(1)	(2)	(3)	(4)
ΔNPA_{t+1}	0.024	0.023	0.040	0.020
	(5.11)	(26.404)	(11.694)	(22.271)
ΔNPA_t	0.078	0.038	0.092	0.032
	(14.65)	(38.330)	(22.346)	(31.466)
ΔNPA_{t-1}	0.028	0.052	0.091	0.047
	(4.78)	(56.620)	(24.844)	(49.815)
ΔNPA_{t-2}	0.087	0.047	0.085	0.042
	(17.74)	(52.446)	(23.152)	(46.208)
$Size\_t-1$	2.0E-4	1.0E-4	1.0E-4	1.0E-4
	(7.28)	(52.474)	(18.192)	(40.846)
$\Delta Loan_t$	0.007	0.003	0.003	0.003
	(11.99)	(33.377)	(11.586)	(31.386)
$\Delta Unemployment_t$	0.001	0.001	0.002	0.001
	(9.69)	(22.943)	(11.205)	(19.452)
ΔGDP_t	-0.004	-0.008	-0.011	-0.008
	(6.70)	(-58.314)	(-21.364)	(-53.695)
$RealStateInd\_t$	-2.0E-4	-8.3E-7	-5.8E-6	-8.3E-7
	(5.82)	(-15.106)	(-8.511)	(-12.355)
$Constant$	0.001	-4.0E-4	1.4E-4	-4.0E-4
	(5.02)	(-15.788)	(-1.584)	(-12.605)
Observations	33,205	472,384	58,927	413,457
R-squared	0.169	0.096	0.176	0.083
Bank Sample	Beatty & Liao	All	Public	Private

Table A.3: **Loan loss provision models.** The table reports OLS estimation of determinants of loan loss provision models. Robust t-values are reported below the coefficient estimates.

A.8 Equity transfers and sales

In this section we further examine the mechanisms that banks use to manage the reported regulatory capital figure with increases in equity. We explore separately equity transfers made form the BHC to the subsidiary (EqT) and equity sales (EqS). Table A.4, reveals that banks are more likely to use these tools when they are close to (but to the left of) the 10% threshold of unmanaged regulatory capital. The indicator variables, Low_RegCap_EqT and Low_RegCap_EqT, remain positive and statistically significant using alternative polynomial orders and bandwidths, which suggests that the discontinuity is not sensitive to those choices.

	Accretive_X				
	(1)	(2)	(3)	(4)	(5)
Panel A					
Low_RegCap_EqT	0.236	0.270	0.226	0.316	0.286
	(13.651)	(19.845)	(12.152)	(25.653)	(24.716)
Observations	12,154	25,035	25,035	101,965	101,419
Adj R-squared	0.200	0.194	0.195	0.174	0.274
Panel B					
Low_RegCap_EqS	0.114	0.158	0.116	0.167	0.130
	(5.605)	(9.092)	(5.449)	(10.412)	(9.176)
Observations	7,459	16,017	16,017	67,919	67,475
Adj R-squared	0.077	0.070	0.071	0.057	0.261
Polynomial Order	1	1	2	2	2
Sample	±0.25	±0.5	±0.5	±2	±2
Controls	Yes	Yes	Yes	Yes	Yes
Bank FE	No	No	No	No	Yes
Quarter-year FE	Yes	Yes	Yes	Yes	Yes
Supervisor FE	Yes	Yes	Yes	Yes	Yes

Table A.4: **Regulatory capital management using EqT and EqS.** The table shows the relationship between regulatory capital before the management and the probability of having $Accretive\_EqT$, and $Accretive\_EqS$ in a bank-quarter. Each column presents the results for different bandwidths around the 10% threshold and alternative polynomial orders for the regulatory capital deficit before EqT and EqS. All variables are defined in Appendix A.1. Standard errors are clustered at the bank level. Robust t-values are reported below the coefficient estimates.

Appendix B

Appendix to Chapter 2

B.1 Variables definition

Variable Name	Description	Call Report Code
Accretive ALLP	Dummy variable that takes the value one when ALLP net of taxes increase regulatory capital through Tier 1 by at least 0.05%, and zero otherwise.	
Accretive RGL	Dummy variable that takes the value one when RGL net of taxes increase regulatory capital by at least 0.1%, and zero otherwise.	
AFS	Total fair value of available-for-sale securities normalized by lagged total assets.	RCFD1773, RCFD2170
ALLP	Abnormal component of LLP (following Beatty2014) multiplied by lagged total assets normalized net risk-weighted assets	RCFD2170, RCFDA223
Audited	Dummy variable that takes the value one when financial statements are audited by an external auditor, and zero otherwise.	RCFD6724
Cash	Cash normalized by lagged total assets.	RCFD0010, RCFD2170
Enforcement_Q4	Dummy variable that takes the value one if there is at least an enforcement action against the bank in the following four quarters, and zero otherwise.	Hand collected
Lenient	Dummy variable that takes the value one if the state bank is located in a state where the Agarwal et al.'s index is above the median and zero otherwise.	Agarwal et al. (2014)
LLA	Loan loss allowance normalized by lagged total assets.	RCFD3123, RCFD2170
LLP	Loan loss provision of the quarter normalized by lagged total assets.	RIAD4230, RCFD2170
Loan	Total loans normalized by lagged total assets.	RCFD2122, RCFD2170
Low_RegCap_ALLP	Dummy variable that takes the value one when RegCap_ALLP is lower than 10%, and zero otherwise.	
Low_RegCap_RGL	Dummy variable that takes the value one when RegCap_RGL is lower than 10%, and zero otherwise.	
National Bank	Dummy variable equal to one for national banks and zero for state banks.	RSSD9055
Net Income	Income before taxes normalized by lagged total assets.	RIAD4301, RCFD2170
Non-interest Expenses	Non-interest expenses normalized by lagged total assets.	RIAD4093, RCFD2170
Non-interest Income	Non-interest income normalized by lagged total assets.	RIAD4079, RCFD2170
NPL	Includes the outstanding balances of loans and lease financing receivables that the bank has placed in non-accrual status plus restructured loans and lease plus loans and lease financing receivables on which payment is due and unpaid for 90 days or more, normalized by lagged total assets.	RCFD1403, RCFD1407, RCFD2170
RegCap	The sum of Tier 1 and Tier 2 capital normalized by net risk-weighted assets.	RCFD8274, RCFD8274, RCFDA223
RGL	Realized gains and losses on available for sale securities normalized by net risk-weighted assets.	RIAD3196, RCFDA223
Sd_ROA	Standard deviation of return on assets.	RIAD4340, RCFD2170
Size	Natural logarithm of total assets.	RCFD2170

B.2 Enforcement actions: matching procedure

In this section we describe the matching procedure use to incorporate the enforcement actions. We hand collect formal enforcement actions executed by the federal agencies from their web sites: FDIC,[1] OCC,[2] and FRB.[3] We match the enforcement actions with data from Call Reports using bank names and cities. There are some inconsistencies in the names and cities provided by regulatory agencies and call reports that hinder our ability to correctly match both datasets. Therefore, before proceeding to matching them, we first make transformations in both samples on the bank's name and city to homogenize the spelling. In particular, we eliminate leading and trailing spaces, we transform both fields to uppercase, and eliminate dots ".", commas ",", apostrophes " ' ", dashes "-", parenthesis "()", and the article "the". In addition, we make the following changes to banks names:

- Replace "&" for "AND"
- Replace "BK" for "BANK"
- Replace "B AND TC" for "BANK AND TRUST COMPANY"
- Replace "B AND T" for "BANK AND TRUST"
- Replace "T AND LA" for "THRIFT AND LOAN ASSOCIATION"
- Replace "T AND LC" for "THRIFT AND LOAN COMPANY"
- Replace "T AND SB" for "TRUST AND SAVING BANK"
- Replace "L AND IB" for "LOAN AND INVESTMENT BANK"
- Replace "C" or "CO" for "COMPANY"

[1] https://www5.fdic.gov/edo/TextSearch.html. We search on the section "FDIC Enforcement Decisions and Orders" using "enforcement" as keyword.

[2] https://apps.occ.gov/EASearch/Search/. We search on the section "Enforcement Actions Search Tool," advance search, using only dates with no keyword.

[3] https://www.federalreserve.gov/apps/enforcementactions/search.aspx. We search on the section "Search Enforcement Actions," using only dates with no keyword.

- Replace “TC” for “TRUST COMPANY”
- Replace “NB” for “NATIONAL BANK”
- Replace “NA” for “NATIONAL ASSOCIATION”
- Replace “FSB” for “FEDERAL SAVINGS BANK”
- Replace “CMRL” for “COMMERCIAL”
- Replace “INTL” for “INTERNATIONAL”
- Replace “FNCL” for “FINANCIAL”
- Replace “CMNTY” for “COMMUNITY”
- Replace “SVG/S” for “SAVING/S”
- Replace “CTY” for “COUNTY”
- Replace “BKG” for “BANKING”
- Replace “SVC” for “SERVICE”
- Replace “CTR” for “CENTER”

We employ the “reclink” probabilistic record matching program for Stata to match bank’s names. The program put together two different Stata datasets based on non-exact string keys. We specify a minimum overall matching score value of 0.97 to declare two observations a match. We also required a perfect match on bank’s city. After this procedure, we obtain 929 matches (502 perfect matches) for FRB enforcement actions, 1266 in the case of the OCC (950 perfect matches), and 1915 matches (1113 perfect matches) for FDIC. Notice that we collect enforcement actions on all banks and later reduce the sample to small, private, never enforced banks. The final sample has a total of 1,910 enforcement actions from 1,491 SPNE banks.

There are several types of actions: i) cease-and-desist orders, ii) suspension, removal or prohibitions of individuals from associating with a bank,iii) civil money penalties, iv) Section 19 Letters, v) written agreements, vi) prompt corrective actions, vii) modifications and terminations and viii) orders of interlocutory review. Cease-and-desist orders, not only include prohibition of certain types of practices, but also usually include replacement of top management, approval of promotions and new hires for senior positions, and greater control of credit risks. Removal or prohibitions orders set aside individuals from associating with an insured institution for specific violations of law, regulations or agreements. Assessment of Civil Money Penalty, are imposed for violations of law, regulation, Cease-and-desist orders, or any other written agreement. The monetary penalty is proportional to the seriousness of the violation and can range from $1,000 per day for simple violations to $25,000 per day for reckless actions.